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ABSTRACT

This document contains the third of five volumes reporting the activities and results of a career education evaluation project conducted to accomplish the following two objectives: (1) to improve the quality of evaluations by career education projects funded by the United States Office of Career Education (OCE) through the provision of technical assistance to fifteen of these projects; and (2) to identify, as a result of this technical assistance effort, a field tested model which can be used by other career education projects funded by OCE in future evaluation efforts. This volume contains the rationale, procedures, and results of the outcome and process instrument validation and construct definition activities. The first of five chapters discusses the need for adequately validated career education instruments and presents the learner outcomes used in the evaluation. Chapter 2 provides justification for the logic of construct definition, and chapter 3 presents the techniques used in the construct definition procedure. Chapter 4 discusses the selection and development of the instruments used, and chapter 5 presents the results of the substudy. (BM)

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TECHNICAL ASSISTANCE IN EVALUATING CAREER EDUCATION PROJECTS

Contract 300760312

FINAL REPORT
VOLUME III
THE CAREER EDUCATION INSTRUMENTATION SUBSTUDY

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Submitted to:

DHEW/US Office of Education
Office of Career Education

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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PREFACE

This report has been prepared pursuant to the requirements of DHEW/USOE Contract Number 300760312, *Technical Assistance in Evaluating Career Education Projects*, for the Office of Career Education. This contract was awarded to National Testing Service, Inc., (NTS) on June 21, 1976, to accomplish the following two objectives:

1. To improve the quality of evaluations conducted by OCE-funded career education projects through the provision of technical assistance to fifteen of these projects.
2. To identify, as a result of this technical assistance effort, a field tested model which could be used by other career education projects funded by OCE in future evaluation efforts.

Contractors are encouraged to provide objective, independent evaluations; therefore, none of the results or positions presented in this report necessarily reflect official Office of Career Education policy.

This is Volume III of the five volumes comprising the common Career Education Evaluation Final Report. The volumes include the following:

Volume I: Summary Volume. This volume contains highlights of the study design and results.

Volume II: The Career Education Evaluation Final Report. This, the main body of the report, contains detailed information about the background of the evaluation, the evaluation design, and the results of the evaluation. Three appendices are included, as well: (1) summaries of the fifteen local evaluations; (2) a summary of the technical assistance provided by NTS; and (3) all instruments used in the study.

Volume III: The Career Education Instrumentation Substudy. This volume contains the rationale, procedures, and results of the outcome and process instrument validation and construct definition activities undertaken by NTS under this contract.

Volume IV: Turnkey Manual for Evaluating Local Career Education Projects. The Turnkey Manual was prepared for distribution to participating projects and contains the necessary information for longitudinal continuation of this evaluation at the project level.

Volume V: The Career Choice Substudy. This volume contains the design and results of a study of the relationships of career education to secondary students' career choices.

In addition to these five common report volumes, NTS prepared unique local evaluation reports for each of the fifteen participating projects.

ACKNOWLEDGEMENTS

Completing this evaluation was not easy, even though we received the help of many people who gave much of their scarce time and abundant knowledge. This evaluation had to traverse much previously uncharted territory; without the help of numerous guides, guards, and bearers the evaluation team might never have reached its goal.

We owe special thanks to the local project staffs. Hard-pressed by their own tasks they still put up with our problems, showed forebearance over delays, and were always ready to provide assistance and information when necessary. Even though we are prevented by concerns of preserving project anonymity from thanking all these people by name, the assistance they offered is worth many extra tips of the hat.

Equally important are the thousands of students, teachers, counselors, and principals who provided the substance for this evaluation. These are the nameless, unsung heroes to whom any evaluator owes special gratitude. We owe more than most; the burden imposed was heavy, yet the response was satisfyingly high.

Our thanks go not only to those at the local level but also to those in the federal government who, with more direct know-

ledge of our efforts, still provided encouragement and assistance, along with gentle prods and remonstrances when necessary. Our OCE project officer, Terry Newell, deserves to be singled out for praise. Despite an already loaded schedule, he was always available when needed. His assistance took many forms; he was involved extensively in evaluation design development, instrument selection and preparation, selection of analysis strategies and techniques, and reviewing draft reports. His aid in completing the process instruments and shepherding them through OMB went far beyond that required by his role. Kenneth B. Hoyt, Director of the Office of Career Education, not only provided general support for our efforts but also gave direct and useful assistance in preparation of process instrumentation. Gloria Butler and Prentice Echols, monitors of the projects in this study, helped keep the projects and the evaluation team moving toward the same point.

Norman Audi, Peggy Saunders, and Bob Rothenberger of the OE contracts office, without whom the evaluation would not have been completed, deserve our thanks as well.

Alice Scates from OPBE and Robert Wise, Lois-ellin Datta, Carlyle Maw, Ron Bucknam from NIE, and Jerry Walker of the Ohio State Center for Vocational Education provided continued assistance in all stages of this evaluation and attended a number of project conferences. They offered us many useful ideas and served as a valuable sounding board for some of ours. Lana Muraskin of NIE assisted in the conceptualization and analysis of the career choice data presented in Volume V of this report.

Preparation of the process forms was assisted by Don Phillips of the National Assessment of Educational Progress and by Jay Davis of the Research Triangle Institute's National Longitudinal Study of the High School Class of 1972. Dale Holden of the Redlands II School District of South Carolina graciously allowed us to pilot our Student Information Form in his district.

Finally, of course, we offer our sincere appreciation to those at NTS who participated in the various stages of this project. Special thanks go to Helmuts Feifs, Dick Rohlf and Joan Troy for their timely and valuable help in writing this report. Steve Davis, Blyth Gabriel, Keith McNeil, Jack Bailey, Carol Hill, and Bernie Schmidt all offered professional assistance when needed. Former NTS staffers Robert Pinnell, Darrell Myrick, Bill Katzenmeyer, Henri Belfon, and John Goode made important early contributions. Wayne Parks and Lynn Cowell kept us within budget.

This was a data-rich evaluation. The tables in this and the other volumes give but a hint of the time and effort needed to produce them. To Frances Pendergrass and Steve Rihner, who supervised and performed much of the data reduction and analysis, we owe many thanks. To those who assisted them, Dana Hardwick, Jeff Forrest, Steve Lesh, Bob Fritz, and Norm Friberg we offer our gratitude as well. Elizabeth Goodrich provided valuable assistance on unique project data. An efficient team of data editors included Gloria Ripperton, Victoria Brighton, Betty Hill, Florence Dickerson, and Mary Cook.

Preparing the five volumes of this report, as well as unique reports for each of the participating projects, was the responsibility of Pauline Matson, NTS's Director of Support Services. She was ably assisted by Dianne Gupton, Barbara Leonard, Deborah Parker, and Mary Dickens, Ray Alderson, Eleanor Johnson, Judy Smith and, during earlier drafts, Phyllis Thomas, Linda Conly, and Brenda Scarborough. Debbie Ward and Bill Roycroft had the unenviable task of making copies of all these reports. Skip Anderson did most of the design work.

To all of those named above and, especially, to those we could not name, we offer a most sincere, "Thank You."

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1

INTRODUCTION

This volume of the Career Education Evaluation Final Report focuses on the rationale, procedures, and results of the construct definition activities undertaken by NTS in carrying out this evaluation. This chapter highlights the reasons that led to this rather extensive effort. Chapter 2 provides justification for the logic of construct definition, and Chapter 3 presents the techniques that were utilized. Chapter 4 discusses the selection and development of the instruments studied in this substudy; Chapter 5 presents the results. All the instruments used to collect information about career education learner outcomes, i.e., the learner outcome instruments, are included in this study with the exception of those measuring basic skills. In addition, analysis of the Career Education Value Internalization Instrument, an implementation/process instrument administered to teachers, counselors, and principals, is discussed as well.

Two primary factors led to this study. First, the lack of adequately validated outcome and process instruments has hindered evaluation of career education programs (refer to Newell, 1976). Second, commercially available outcome instruments have not been

shown to provide an isomorphic match with the Office of Career Education's learner outcomes. This chapter examines both of these points.

Need for Adequately Validated Career Education Instruments

The lack of suitable tools, i.e., instruments, has drawn comments from both evaluators and decisionmakers. Bill and Carolyn Raymond, in commenting on their review of available instrumentation, reported that "many of the items tend to focus on superficial behaviors rather than significant outcomes...many of the commercial materials we have examined tend to focus on one or two of the broad dimensions of career education." Further, "seldom is it possible to find a test item dealing with high level cognitive behaviors. Affective items are few and far between in the tests we have examined." Finally, they also suggest that, "unfortunately, there are few commercially prepared tests that present instrumentation appropriate for measurement at all grade levels. This means that the local practitioners utilizing these materials must adapt the evaluation around the structure of the test, or assessment is just not accomplished at many of the instructional levels" (Raymond and Raymond, 1976, pp. 10-12).

In his efforts to "stimulate constructive dialogue" to improve the evaluation of career education programs, Terry Newell emphasized the problems of instrumentation:

> One area on which almost all practitioners agree is the need for new instruments for use in career education evaluation. While some instruments developed

> for other purposes are usable in part, there are very few instruments carefully developed based on career education objectives. The new instruments must be based on a sound conceptual base, and they must be technically sensitive to local program effects. Development of such instruments will take time, perhaps 3 to 4 years. While the Office of Education and the National Institute of Education have begun cooperative efforts in this area, their resources will need to be augmented by much greater State and local efforts. Some very helpful State efforts are already underway in this area (Newell, 1976, p. 111).

This point was emphasized further in NTS's Evaluation Design Document. Speaking to the problems of coverage of learner outcomes and reliability, NTS's evaluation team reported that:

> Outcome instrumentation for this evaluation relies heavily on content analysis to ensure coverage across the OE learner outcomes. Unfortunately, psychometric data on the majority of career education instruments is frequently insufficient to support a decision on whether an instrument purporting to measure a learner outcome does <u>in fact</u> measure that outcome.
>
> One ready (albeit unsatisfactory) solution to the problem is to ignore the structural properties of the tests and, in essence, take the test author's word for what the test measures. The fact that an instrument carries the words <u>career awareness</u> in the test title is taken as sufficient evidence that the instrument measures career awareness (NTS, 1976, pp. 6.22-6.23).

In Chapter 4 of this volume we discuss the instruments we selected for measuring learner outcomes and those we developed for tapping practitioners' opinions about career education. The selection procedures were extensive, yet none of the available instruments were found to be wholly satisfactory. The validation results presented in Chapter 5 should help rectify that problem, as well as providing more insight into what the instruments actually are measuring. It is to this latter problem of instrument/learner outcome isomorphism that we now turn.

Measuring Learner Outcomes

Two problems are present here. First, some of the Learner outcomes suggested by the Office of Career Education are neither directly measurable nor, in a few cases, easily operationalized. Second, even though a number of commercially available outcome instruments purport to address specific outcomes, little evidence exists to demonstrate that they actually do so. The first of these problems was encountered early in this evaluation and NTS's resolution of it is presented below. The second of these problems is addressed as a central topic in the remainder of this volume.

The learner outcomes developed by OCE are presented in Table 1.1. Although these have since been superceded, this was the outcome set to which projects responded in the 1976 Grants Announcements and which potential contractors for this evaluation were to address.*

The learner outcomes listed in Table 1.1 had to be adapted for the present evaluation effort. Changes were made because of the lack of adequate instrumentation in some of the outcome areas and because some of the OCE learner outcomes are not readily operationalized. For example, the eighth outcome is not amenable to measurement through a pre-posttest instrument as it concerns behaviors after leaving school. The fourth outcome contains two distinct sets of skills--job getting/job hunting and decision-making--skill sets which are not integrated logically. Further, decisionmaking appears to play a part in outcomes four, six, and

---

*The most recent OCE formulation of the career education learner outcomes can be found in A Primer for Career Education, Hoyt, 1977, p. 35. This newest set does not suffer as extensively as that used for this study from the problems mentioned in this section.

Table 1.1

Office of Career Education Learner Outcomes*

Career education seeks to produce individuals who, when they leave school (at any age or at any level), are:

1. Competent in the basic academic skills required for adaptability in our rapidly changing society.

2. Equipped with good work habits.

3. Capable of choosing and who have chosen a personally meaningful set of work values that foster in them a desire to work.

4. Equipped with career decisionmaking skills, job-hunting skills, and job-getting skills.

5. Equipped with vocational personal skills at a level that will allow them to gain entry into and attain a degree of success in the occupational society.

6. Equipped with career decisions based on the widest possible set of data concerning themselves and their education-vocational opportunities.

7. Aware of means available to them for continuing and recurrent education once they have left the formal system of schooling.

8. Successful in being placed in a paid occupation, in further education, or in a vocation consistent with their current career education.

9. Successful in incorporating work values into their total personal value structure in such a way that they are able to choose what, for them, is a desirable lifestyle.

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*Hoyt, Kenneth B. An Introduction to Career Education: A Policy Paper of the U.S. Office of Education. Washington, D.C.: US/DHEW, 1975.

seven. The general nature of the OCE learner outcomes led NTS to develop the adaptation presented in Table 1.2.

Chapter 4 discusses the instrument matchups expected in this study for these adapted outcomes, based on item content validity. Chapter 5 presents the results derived from the construct definition procedures.

Table 1.2

Learner Outcome Adaptation Used in This Evaluation

Upon leaving the formal educational system, students should be:

1. Basic Skills. Competent in the basic academic skills required for adaptability in our rapidly changing society.

2. Good Work Habits. Equipped with good work habits.

3. Work Values. Equipped with a personally meaningful set of work values that foster in them a desire to work.

4. Job Hunting/Job Getting Skills. Equipped with job hunting skills and job getting skills.

5. Career Decisionmaking Skills. Equipped with the career decisionmaking skills required to choose from among career options.*

6. Continuing Education. Aware of means available to them for continuing and recurrent education.

7. Placement. Either placed or actively seeking placement in a paid occupation, in further education, or in a vocation consistent with their current career decisions.

8. Self-Concept. Equipped with perceptions of one's self, including perceptions of one's abilities and relationships with others.**

9. Career Awareness. Equipped with a degree of self-understanding and understanding of educational/vocational opportunities sufficient for making sound career decisions.

---

* It was the opinion of the NTS staff that the fourth learner outcome stated by Hoyt should be evaluated as two separate outcomes; thus, we have placed decisionmaking as a separate outcome incorporating similar concepts from OCE's sixth and seventh outcomes as well.

** All of the sources which specify learner outcomes for career education mention the importance of self-awareness and self-understanding. We have chosen the broader notion of self-concept to conceptualize this outcome; adequate instrumentation was available for self-concept but not for self-awareness and self-understanding.

2

CONSTRUCT DEFINITION

When observables are classified, typed or otherwise grouped, a construct has been created. Cronbach (1971) notes that constructs are "deliberate creations chosen to organize experience into general law-like statements" (p. 462). The term construct is preferable to intervening variable or concept in that it denotes human invention: the regularities (i.e., patterns) in human behaviors are discovered, the constructs created to explain these regularities are invented.

In the present career education evaluation, observables are cognitive, affective, and process items responded to by teachers, counselors, administrators, and students. Regularity or pattern in the ways these items correlate with one another suggests the existence of some unobservable organizing influence. Our postulates about the nature of the organizing influence comprise the construct. Construct validation involves checking the commensurability of our constructs with experience. Nagel (1961) states:

> Scientific thought takes its ultimate point of departure from problems suggested by observing things and events encountered in common experience; it aims to understand these observable

> things by discovering some systematic order in them; and its final test for the laws that serve as instruments of explanation and prediction is their concordance with such observations (p. 79).

The construct formulation process is inductive. When we observe regularity in the correlations among a set of items we induce a common underlying influence; i.e., we infer from the structure of a set of items that some more basic organizing influence is operating to create the observed pattern of relationships. Typically, a label is then assigned to the organizing influence based upon a content analysis of the items.

The term "indicant" refers to a variable (which is an observable that can take on two or more ordered values) that has been first identified as logically related to a construct, and the relationship subsequently has been verified empirically. Test items dealing with what people do in various occupations might be indicants for a construct labeled "career knowledge". We invent the construct "career knowledge" to explain the finding that student responses to items dealing with what people do in different occupations tend to correlate highly with one another. The further finding that the observed pattern of inter-item correlations is highly invariant would support the contention that a pervasive organizing influence is operating. Although the organizing influence itself is unobservable, we can infer its nature through an examination of the indicants. We note that the indicants share a common quality, which we choose to label "career knowledge". The label serves as a shorthand reference to a more lengthy description of the construct.

If a construct is related to one and only one indicant, and no surplus meaning (i.e., meaning which is not explicit in the use of the indicant) is attached to the construct, then the relationship between construct and indicant is tautological. Thus, if the construct and indicant are completely interchangeable, with each being a sufficient replacement for the other, then the indicant-construct relationship does not meet the defining criteria for the term construct. Implicit in the term construct is a reduction process which requires that the "number of degrees of freedom of the construct is smaller than the number of degrees of freedom of the phenomena that the reduction is expected to subsume (Thurstone, 1947, p. 52).

One consequence of the above stated "degrees of freedom" criterion is that constructs never perfectly represent the observables; as with all abstraction, there is a trade-off involving a loss in particularity but a gain in generality. Abstractions, by their nature, focus on that which is common to a set of observables, and, consequently, fail to reflect whatever specific variance is present. Thurstone (1947) summarizes this position in the following manner:

> Each generalization in the scientific description of nature results in a loss in the extent to which the ideal constructs of science match the individual events of experience. This is illustrated by simple experiments with a pendulum, in which the mass, the period, and the locus of the center of gravity with reference to a fulcrum are involved in the ideal construct that leads to experimental verification. But the construct matches only incompletely the corresponding experimental situation. The construct says nothing about the rusty setscrew and other extraneous detail. From the viewpoint of immediate experience, scientific description is necessarily incomplete. The scientist always finds

> his constructs immersed in the irrelevancies of experience. It seems appropriate to acknowledge this characteristic of science, in view of the fact that it is a rather common notion that the scientific description of a person is not valid unless the so-called "total situation" has been engulfed. A study of people does not become scientific because it attempts to be complete, nor is it invalid because it is restricted. The scientific description of a person will be as incomplete from the viewpoint of common sense as the description of other objects in scientific context (p. 53).

We have argued that construct structure is defined by the relationships among a set of indicants and by the relationships between the indicants and the construct. Both the relationships among indicants and the relationships between the indicants and the construct can be represented as matrices of correlation coefficients. If the number of indicants is small, say four or five, each matrix can be examined and a construct invented to account for the observed structure. If the number of indicants is large, or if more than one construct may be defined by a particular set of indicants, factor analysis is useful in assisting in the search for structure. Guertin and Bailey (1970) stated:

> Factor analysis is disarmingly simple in its basic purpose and becomes complex only through its ramifications. All that factor analysis purports to do is examine a matrix expressing the correlations of each variable with every other variable. Small matrices of intercorrelations can be inspected visually to see which variables seem to covary together but are independent of others in the matrix. In an important sense, factor analysis is a formal decision-making process to explicate subsets of covarying variables no matter how numerous they may be (p. 1).

When a label, other than a symbol such as "x" or "UI 15," is assigned to an observed structure of covariation (correlation), surplus meaning is imparted to the covariation structure and a construct has been born. A construct is invented to account for an observed structure in the sense that inferences are made about

the nature of the "underlying organizing influence" which both created the covariation structure and which is manifested in the covariation structure. Using factor analysis, a factor is discovered in the sense that it reproduces, according to specific criteria (with some error), the covariation structure observed among the indicants. A set of indicants for a particular construct represents a functional unity. "The unity of a set of parts is established by their moving--i.e., appearing, changing, disappearing--together, by their exercising an effect together, and by influence on one being an influence on all (Cattell, 1966, p. 71). If a structure consistently reappears with changes in sample and indicants, then there is "reason for maintaining that the construct is 'fundamental' and indicates some basic and universal characteristics of the underlying structure (Henrysson, 1957, p. 90). If a construct corresponds to some "real" organizing influence, then the indicants for the construct will retain an essentially invariant structure from study to study. A number of terms, including "fundamental," "underlying influence," "functional unity," "real existence," "determiner," etc., have been used in referring to the nature or cause of a particular covariation structure.

We must now examine the ontological significance of a construct, i.e., the reality which can be imputed to a construct defined using factor analysis. A construct is not a fundamental universal quality, attribute, or disposition, but rather it is a theoretical construction, a hypothesis about the nature of some observed organizing influence.

The term "functional unity" has been used to describe the observation that the relationships among a set of indicants appear, change, and disappear in unison. As Coan (1964) has noted, "functional unity" is itself not a unitary concept, in that it implies several kinds of interrelationships:

> For one thing, it may imply a high level of causal interaction among elements, each directly affecting the others to a greater extent than it affects elements forming other factors. A second possibility is that constituent elements of the functionally unitary trend have a common source in a unified maturational process or a unified determining environmental context. Certain learned performances (e.g., that displayed in a vocabulary test) clearly illustrate this kind of unity. A third possibility is that the constituent elements display a common behavioral effect, or at least a convergence of effect, which tends to reduce their mensural separability. Whatever the multiplicity of influences, anatomical organs and physical dimensions display this sort of unity. Obviously some psychological or behavioral factors may function in the same way (p. 132).

Cattell, for one, leaves little doubt that he views factors as marking a more general source or cause of the observed covariation structure among indicants. He states:

> The scientific model we are now developing as an extension of the preliminary mathematical model, and which will have additional restrictions and properties, aims to find dimensions of common variation, which may further be recognized as sources of observed variance and therefore as underlying determiners or causes (1966, p. 180).

Those theorists (Anastasi, 1938; Burt, 1941) who hesitate to view an invariant indicant structure as the result of a more pervasive cause seem to be fearful of admitting to an invisible generator within the organism. If we make "invisible generators" synomonous with a general characteristic and posit that general influences determine specific instances, then we short-circuit the tendency toward reification.

In summary, then, an interpreted factor is a construct represented by an indicant structure in which the indicants are recognized as being sampled from a domain of indicants related to the construct. The observed covariation structure among indicants is a specific expression of a more general and pervasive influence which serves to determine the nature of the covariation structure.

Principles of Definition

The previous section addressed the meaning of the term "construct". Here we will consider what is meant by the term "definition". Following are several famous definitions of "definition":

Plato: When someone asks you what a thing is, being able to answer him by means of the elements of the thing.

Aristotle: The account of the essence of the thing.

Cicero: A certain brief and circumscribed account of the properties of the thing we wish to define.

Milton: That which refines the pure essence of things from the circumstance.

Spinoza: The true definition of each thing involves nothing and expresses nothing but the nature of the thing defined.

First, let us distinguish between the purpose and method of a definition. The purpose of a definition refers to the ends we propose to achieve, whereas the method is the means which we employ to reach these ends. The purposes of construct definition are to specify the meaning of a construct and to achieve consensus in its use. Two methods, about which we will have more to say in

the next section, which we employ toward the goal of specification of meaning are intrinsic and extrinsic definition.

It is useful to consider, as background, some types of definition with which we will be concerned only peripherally in this study. The first such type is "lexical definition". A lexical definition of a word is a statement about its past usage, i.e., a historical report. With the evolution of career education such words as "work" and "career" have taken on new meanings and nuances, and lexical definitions of these terms should reflect these changes. Problems arise when old words are given new and sometimes subtly different meanings. Robinson (1954) stated: "Men will always be finding themselves with a new thing to express and no word for it, and usually they will meet the problem by applying whichever old word seems nearest, and thus the old word will acquire another meaning or a stretched meaning" (p.55). Likewise, words carry certain emotional and attitudinal qualities which vary from individual to individual. The words "vocation" and "vocational" do not appear often in the career education literature, not so much because their meaning is inappropriate, but rather because they arouse particular emotions and associations that are viewed as undesirable among special interest groups.

The evaluation team must meet issues of lexical definition when labeling constructs. There is a delicate balance between attending to historical precedent when assigning labels while, at the same time, choosing labels with a minimum of extraneous meaning. Finding terms which are descriptive of the inferred organizing influence is difficult enough, but the task becomes

almost impossible when further constrained by the requirement of minimizing excess meaning.

Humpty Dumpty was a connoisseur of another type of definition called stipulative definition. He was not concerned that his word usage conform to any previous meanings. He simply would stipulate that a particular word had a particular meaning at a particular time. Robinson states:

> "A stipulative definition stipulates that, whatever the word may mean in other communications or even in earlier parts of this communication, it is for the rest of this communication to be taken as having no meaning whatever, except the one now stipulated. Any previous meanings are thereby abolished for the remainder of this communication" (p. 60).

Thus, when Hoyt (1975) defines work as "conscious effort, other than that involved in activities whose primary purpose is either coping or relaxation, aimed at producing benefits for oneself and/or for oneself and others" (p. 3), he is providing a stipulative definition. Hoyt goes on further to differentiate "work"--as purposeful, meaningful, productive effort from "labor" which is involuntary, meaningless effort without individual purpose or sense of accomplishment. With this definition, Hoyt is clarifying the term "work" and divorcing it from terms, such as "labor," which are used as synonyms in more common parlance.

From the above discussion it should be clear that stipulative definitions have no truth value, i.e., there can be no argument about the veracity of a stipulative definition, since it does not purport to represent the past, but simply presents a rule for using a word in the future. Although stipulative definitions need possess no truth value, a reasonable person still must somehow negotiate an obligation to past use and convention. A completely

arbitrary stipulative definition serves no other purpose than the generation of confusion; therefore, a lesson for construct definition is that we should avoid using words in novel senses when creating construct labels.

Robinson (1954) summarizes nicely the rationale for stipulative definition as it affects the process of construct definition:

> The greatest justification of the doctrine that stipulation is free, is that it includes the claim for the right to that redefinition of concepts which is essential to science. There can be no sure and far-reaching control and prediction of events on the basis of the vague and shifting words and notions of ordinary life. We must be released from the lexical definitions which merely describe common usage in all its unscientific nature, and allowed to stipulate simpler, more precise, and more univocal words and ideas, if we are to have science (p. 73).

One troublesome, though not often recognized, problem with stipulative definition is that we cannot stipulate emotions. Stipulative definition may be used to change the denotation of a term, but prior connotations are not altered so easily. This observation suggests another criterion for label selection: construct labels that provoke strong emotional reactions should be avoided. Terms that describe an inferred organizing influence, while being neither entrenched in some tradition nor emotionally laden, are to be preferred. When selecting labels and when using terms to describe the inferred organizing influence more fully, the intentions inherent in the ordinary use of those employed words should be preserved as much as possible.

At times the process of construct definition draws upon both lexical and stipulative definition. Hempel (1952) stated: "A real definition is conceived of as a statement of the 'essential characteristics' of some entity, as when man is defined as a

rational animal or a chair as a separate, movable seat for one person" (p.2). Construct definition involves specifying the nature of some inferred organizing influence. The fact that we observe invariant patterns of relationships is itself justification of the existence of some influence. Construct definition is the process whereby we seek description and understanding of the inferred influence.

Intrinsic and Extrinsic Definition

A construct attempts to represent the essential characteristics of an organizing influence; in this sense a construct is a hypothesis about the nature of some organizing influence which has determined the relationships among a set of indicants. Two types of information are available for testing these hypotheses. The first focuses on characteristics of the relationships among indicants and between indicants and construct. The second type of information involves relationships between the construct of interest and other theoretically relevant constructs. The process of organizing the former type of information is termed intrinsic definition, whereas the latter is labeled extrinsic definition. Intrinsic definition is characterized by "prediction of simultaneous appearance," and extrinsic definition by "prediction of succession" (Cattell, 1966).

When people ask the meaning of "career knowledge", they are asking for a construct definition. Some individuals might respond with a strict operational definition and point to a "career knowledge" inventory and say, "This instrument measures 'career

knowledge,' and career knowledge is what this instrument measures." However, such a response is not very helpful. An almost parallel form of the same instrument would require, presumably, another label in order to distinguish one operation from the other. The subsequent proliferation of labels with each alteration in the operation would be numbing and would lead us no closer to an answer to the original question. Another response to the question might be, "You are free to let the term 'career knowledge' mean anything you want it to mean." This response assumes that there is nothing at issue but lexicon. What is at issue, in this case, however, is the need for increased understanding of some thing; the term "career knowledge" should refer to some collection of facts and perceptions which share a bond of relationship such that the collection can be treated as a whole. It is the influence(s) responsible for generating this pattern of relationships that we choose to call "career knowledge." What we normally seek when asking, "what is this construct called 'career knowledge'?" is: (1) an understanding of the construct's constituent elements and their relationships with one another, i.e., the intrinsic definition, and (2) an understanding of the relationships between the construct "career knowledge" and other constructs, i.e., the extrinsic definition. Professor G. E. Moore wrote in Principia Ethica, "The most important sense of 'definition' is that in which a definition states what are the parts which invariably compose a certain whole" (p. 9). In intrinsic definition the "whole" is the construct, its parts are indicants, and the reference to invariability refers to the invariant pattern of indicant covariation. In extrinsic definition the "whole" is some larger theoretical system or

nomological network (to use Cronbach's phrase), the parts are constructs, and "invariability" refers to the laws or law-like relationships which connect constructs to one another in theory.

Observations are aggregated and transformed into constructs through the mental processes of abstraction and generalization. A construct asserts what Braithwaite (1953) calls "a concommitance of properties in the same thing or event" (p. 9). In other words a construct asserts that certain regularities will obtain in the relationships among indicants. Kaplan (1964) states:

> The justification of a specification (definition) is, in general, something to be established: the usefulness of the concept so determined for the performance of the functions in inquiry intended for it. The specification is justified in so far as it has marked out a natural concept. That is to say that its indicators exhibit a considerable congruence: overlap or correlation (the term "correlation concept" has been used in this connection). Every concept actually introduced in inquiry claims that such congruence exists, to a significant degree. Its scientific worth is, in this respect, a matter of whether or not the claim is justified (pp.75-76).

The task of intrinsic definition is to subject an observed pattern of covariation among indicants to a series of structural integrity checks. Among the questions asked are: (1) is the observed structure univocal, i.e., is there one predominant organizing influence operating or several? (2) How replicable is the structure, i.e., how many cases does it take to replicate the structure at a given criterion level? (3) How invariant is the structure across sample characteristics such as age, sex, and race? (4) How constant is the structure throughout the score range on the measure? (5) How stable is the structure over time, e.g., one year interval between pre and posttesting? Procedures

for answering these questions are described later in this report.

Intrinsic definition can proceed without any commitment about the characteristics of the inferred organizing influence. In fact, it is preferable that a construct measure undergo extensive intrinsic definition before the process of extrinsic definition begins. If a construct measure withstands the tests of intrinsic definition, then it can be concluded that some pervasive organizing influence is being measured. What interpretation and label should be given to the inferred organizing influence is the province of extrinsic definition. If the construct measure fairs poorly during the process of intrinsic definition, then it is not only uninteresting to speculate about the nature of the as yet undocumented organizing influence, but the attempt to attach an interpretation and label also will mislead others about what has been discovered.

The process of extrinsic definition generally begins with a content analysis of the indicants composing the construct measure. Content analysis relies on the wisdom, insight, and creativity of the judges to abstract a description of what is common to a set of indicants. Based upon the content analysis, a description of the inferred organizing influence is generated and is expressed as a shorthand description in the form of a selected construct label. This step marks the beginning of an ongoing extrinsic definition process, a process which should remain sensitive to new relationships between the construct and other constructs, and which should lead to modifications in the description of the organizing influence in keeping with new information.

Once an adequate intrinsic definition and the preliminary description have been established for a construct, more systematic and empirical procedures should be employed to further refine that construct's extrinsic definition. Multi-method, multi-trait studies can be initiated to further delineate relationships among a set of constructs. For example, theoretical systems in the form of nomological networks can be hypothesized and tested; similarly, simple predictions of a short-and long-term nature can be formulated and tested. Each of these techniques can contribute to greater understanding of the organizing influence's growth and action. As information accumulates, the description of the organizing influence will expand, and the construct label may be changed to reflect increased precision in our knowledge of the organizing influence's essential characteristics. It must be emphasized that construct definition is an ongoing process that should be responsive to new insights and findings, "for the closure that strict definition consists of, is not a precondition of scientific inquiry but its culmination" (Kaplan, 1964, p. 77).

More than a century ago, Jeremy Benthan suggested that the major obstacle to clear thinking lay in the confused process of labeling or naming things. It should come as no surprise that one of the most troublesome aspects of extrinsic definition is construct labeling. Construct labels are not themselves constructs; rather, the labels are shorthand designations for a more lengthy description of an organizing influence. In selecting a construct label, at least three options are open: (1) a new meaning can be

stipulated for an old word or combination of words, a process which generally involves reducing a term from a general to a much more particular meaning; (2) a term from everyday usage that corresponds as closely as possible to the nature of the organizing influence can be selected; or (3) completely neutral symbols, such as "UI-15" or "X" can be assigned to each construct. Each of the three approaches has certain advantages and disadvantages. If the stipulative approach is employed, we simply are dictating a new meaning for a term whose everyday meaning may be related only peripherally to the construct under consideration. While this allows us to capitalize on the emotional valence inherent in a term, at the same time we are changing what the term is to denote. Of course such a strategy has the disadvantage of adding unfamiliar meanings to what may be rather familiar terms. The second approach is appealing because familiar terms are used to explicate new concepts. The problem is that familiar terms usually are embroidered with unwanted affective overtones which may render them unsuitable for the task of simple description. Although the third alternative avoids the problems of the first two approaches, it is sterile and gives no hint as to the meaning of the organizing influence.

There is no ready made solution to the construct labeling problem; however, we propose using the following guidelines, which were suggested by the above narrative and which were employed in the present study:

(1) The first rule for creating construct labels is to stipulate as little as possible. A construct label is an abbreviation for a longer description of an organizing influence. If the label itself requires further explication of a stipulative nature, then the advantages of a shorthand referent are forfeit.

(2) Construct labels should seldom exceed three words. Again one objective of a label is parsimony in description and reference. Labels of many words are neither easily remembered nor easily manipulated in propositions and conclusions.

(3) Avoid terms that have great emotional force and terms that are "trendy" or loaded with jargon. Construct labels, if they mark an important organizing influence, should be created with the intent that they will endure.

(4) Construct labels should be reviewed by independent critics before being published.

Robinson (1954) provides some insight into the relationship between construct labeling and the larger context of extrinsic definition. He states:

> We do not speak of "science" until we have not merely achieved universally accepted descriptions of what we observe, but also subsumed these descriptions under a system about whose logical consequences there is also no doubt. Science requires universal agreement not merely on the applications of its terms to events experienced, but also on the inferences that can be drawn from those terms when they are combined into propositions. Safe and agreed inferences are possible only with precise and unambiguous terms (p. 70).

The process of construct definition is a necessary prerequisite to any program evaluation. The probability of detecting treatment effects is inextricably related to the quality of intrinsic and extrinsic definition accorded to the process and outcome constructs used in an evaluation. The present career education evaluation was limited to a post hoc examination of several career education measures. Neither time nor cost constraints permitted the kind of development effort that would have

insured well-defined process and outcome constructs. The result of these constraints is that the outcome constructs employed in this evaluation possess only moderately adequate intrinsic definitions and quite poor extrinsic definitions. We turn now to a systematic examination of the intrinsic definition procedures used in this evaluation.

3

INTRINSIC DEFINITION PROCEDURES

The standard procedure for intrinsic construct definition is factor analysis. To review briefly, factor analysis involves the decomposition of an inter-item correlation matrix into a factor loading matrix and an inter-factor correlation matrix. The factor structure matrix, which describes the correlations between items and factors, and the factor estimation matrix, which specifies how the factor scores can be computed as linear combinations of the item scores, can be constructed from these results. These factor scores then represent the measured values on the defined constructs.

In this study the construct definition procedure involved several steps. First, the inter-item correlation matrix was created using squared multiple correlations for the initial estimates of the communalities. The communalities are the squared multiple correlations of each item with the remaining N-1 items.

Using this procedure guarantees that the estimate of the communality will be a lower bound of the proportion of the variance accounted for by the common factors. The reduced inter-item correlation matrix, with the item communalities in the diagonal, then was submitted to a principal components analysis with the resultant factors rotated using the VARIMAX (Kaiser, 1958). This procedure yields N orthogonal factors (i.e., factors that are uncorrelated with one another) that tend to be very strongly related to disjoint sets of items. However, as Cattell and Tatsujioka (1964) have suggested in their exposition of "structural psychometrics," "the structural school necessarily regards this goal of orthogonality as a misplaced preoccupation with mathematical rules, considering that scales should be correlated precisely to the extent of the correlations existing in nature between the personality or ability structures which one is aiming to measure." (p.4) Consequently, the orthogonal factors were rotated to what Thurstone calls "simple structure." The purpose of rotation to simple structure is to produce a factor structure matrix that correlates items and factors as uniquely as possible (which the VARIMAX procedure, because of the orthogonality constraint, cannot do). While many techniques exist for rotating orthogonal factors to simple structure, the procedure chosen here was the PROMAX algorithm (Hendrickson and White, 1964). PROMAX performs an oblique rotation to simple structure by idealizing the orthogonal VARIMAX loadings through raising each loading to a specified power; the original VARIMAX solution is then rotated into maximum conformity with the idealized solution using the PROCRUSTES

method (Hurley and Cattell, 1962). This procedure has been found (Gorsuch, 1970) to yield structures comparable to the structures yielded by other rotational procedures, but in considerably less time. The final step was to examine the nature of the items that have the highest loadings on each of the factors and, based on the content of these items, attach a construct label to the factor.

The process of examining factors with respect to their component items provided some measures of construct validity. Given the inexact nature of the constructs with which career education deals, however, the consistency of the factors was weighted more heavily in determining what factors to retain. Cattell and Taysujoika (1964) suggest three measures of consistency: reliability, homogeneity, and transferability. Reliability is a measure of the factor's invariance across time; as such, it requires some sort of test and retest results. For purposes of this substudy, reliability was assessed by comparing the factor structures derived from the pretest and posttest results of students who took both. Homogeneity is a measure of a factor's invariance across items; i.e., the degree to which the items are all measuring the same thing. Transferability is a measure of the factor's invariance across people, e.g., the degree to which the factor structure remains the same across different racial groups, for the two sexes, or across grades. In the substudy, the assessment of transferability was limited to an examination of racial differences, specifically, the factor structures of blacks and whites; the other racial groups represented only a small fraction of the total sample. Given the presence of other racial effects.

in the data, that have been documented in Volume II, it seemed prudent to investigate what effects race might have on the structure. An assessment of the effects of other variables, such as sex, on the structure was not deemed pertinent.

A procedure for computing a measure of transferability has been developed by Katzenmeyer and Stenner (1975). The measure is called "factorial invariance"; it is, essentially, a coefficient of replicability between factor structures derived from disjoint subsets of the population. Membership in a subset is determined by whatever respondent characteristics the investigator feels may interact with the nature of the structure. Note that it is the invariance of the factor structure, rather than the factor scores, that is being examined here. Given the use of the unit weighting procedures, described later in this chapter, to compute factor scores, this procedure did not seem as relevant as a variation of Cattell's salient variable similarity index S (Cattell, 1949; Cattell and Baggaley, 1960; Cattell, et al., 1969). Cattell's procedure involves reducing the loadings in the factor pattern matrix to plus or minus 1's if they lie outside the hyperplane and 0's if they lie within. Cattell refers to this as the factor mandate matrix. We modified this procedure by replacing the highest loading for each item with a plus or minus 1 and the remaining loadings for each item with 0's. A correlation is then computed between the columns of the two factor mandate matrices that correspond to the factors that are judged to be similar to each other. This judgment must be based upon an external examination, usually using marker variables (Gorsuch, 1974, p. 254)

rather than computing correlations for all possible pairs of factors. This would invalidate any attempt to test the significance of the correlation since it would capitalize upon the effects of chance. While we did not employ a significance test in this substudy, nonetheless we felt that the external validity of the factors should influence an assessment of their comparability. Thus, this procedure, in effect, assessed the similarity of factor structures from the viewpoint of the manner in which the structures specified how the raw item scores should be combined to calculate a construct score.

In addition to the criterion of consistency, an additional criterion of variance accounted for was used to provide an upper limit to the number of factors to be obliquely rotated. Specifically, we examined the proportion of additional variance explained in the principal component solution by extraction of another factor. If extraction of the factor did not provide an appreciable increase in the proportion of variance explained, then it was assumed that the factor was based on either unique or error variance.

One additional criterion used in examining the learner outcome constructs was the construct differentiation index, a criterion described by Katzenmeyer and Stenner (1975). The construct differentiation index (CDI) represents the sample size necessary to generate a replicability coefficient of .95 for a given factor. Factor stability is inversely related to the size of the CDI; a small CDI, for instance, indicates that a factor that was present in the population is also present in a very small sample drawn from that population. On the other hand, a large CDI indicates that a factor found in the population will tend to disappear in a smaller sample.

Using the methods and criteria described above, the construct definition procedure was applied to three different sets of instruments:* (1) the learner outcome battery, consisting of the Ohio Career Development Test (Ohio, 6,8, and 10), The Program of Exploration in Career Education Knowledge Test (PECE), and tests 5001, 5002, 5006, 5007, and 5008 of the New Mexico Statewide Evaluation Program (NM 5001-NM5008); (2) the Value Internalization instrument developed specifically for this study and administered to teachers, counselors, and administrators as part of their respective survey forms; and (3) the Self Observation Scales, treated separately from the other learner outcome instruments.

The learner outcomes of career education include two major classes of effects: (1) changes in career-related knowledge, including academic achievement, and (2) changes in attitudes. Consequently, the learner outcome battery (Ohio, PECE, and New Mexico) was treated as two separate sets of instruments--a set of cognitive items and a set of affective items. The classification of the test items is listed in Table 3.1. A complete description of each of the outcome instruments, including typical items, appears in Chapter 4. The cognitive items generally measure whether a student has acquired and can then recall certain facts related to careers; all responses are scored as either right or wrong. Operationally, a student's response was assigned a value of 2 if correct, a value of 1 if wrong, and a value of 0 if the item was not answered.

The affective item measure attitudes related to careers either by asking directly for opinions or indirectly by asking

*Each of these instruments is described fully in Chapter 4.

Table 3.1

Classification of Cognitive and Affective Learner Outcome Items

Test	Affective	Cognitive	How Scored
Ohio 6, first half		35 questions	2=right, 1=wrong
Ohio 6, second half	35 questions		raw responses used where 1=agree, 2=no opinion, 3-disagree
Ohio 8, first half		34 questions	2=right, 1-wrong
Ohio 8, second half	34 questions		raw responses used where 1=agree, 2=no opinion, 3=disagree
Ohio 10, first half		34 questions	2=right, 1=wrong
Ohio 10, second half	34 questions		raw responses used where 1=agree, 2=no opinion, 3=disagree
P.E.C.E.		75 questions	2=right, 1=wrong
New Mexico 5001	20 questions		1=strong negative attitude 2=negative attitude 2.5=no response 3=positive attitude 4=strong positive attitude
New Mexico 5006			
first half		10 questions	2=right, 1=wrong
second half,			
first set	1 question		.25=no response 1=weaker attitude 2=stronger attitude
second set	9 questions		.5=done nothing .75=no response 1.5=done one of two things 2.5=done both things
New Mexico 5002		20 questions	2=right, 1=wrong
New Mexico 5007		20 questions	2=right, 1=wrong
New Mexico 5008		20 questions	2=right, 1=wrong

for activity levels. The New Mexico 5001 was scored in accordance with the publisher's recommendations: a strong negative attitude was assigned a value of 1, a negative attitude was assigned a value of 2, no response was given a value of 2.5, a positive attitude was given a value of 3, and a strong positive attitude was given a value of 4. A zero was used to indicate that the test had not been administered to the respondent. For the second half of the New Mexico 5006, question 11 was given a value of 2 for a stronger attitude, and a value of 1 for a weaker attitude, and a value of .25 for no response. Questions 12-20 were given a value of 2.5 if the student reported engaging in both activities, 1.5 if engaged in only one of the activities, .75 for no response, and .5 for an indication that nothing had been done. As with the New Mexico 5001, a value of zero indicated that the test had not been administered to the respondent. No publishers' recommendations were available for the second half of the Ohio tests. Consequently, we utilized raw responses where a 1 represented agreement, 2 represented no opinion, and 3 represented disagreement. A summary of the scoring procedures also is presented in Table 3.1.

Preliminary analyses of the item means and the standard deviations indicated that, for many of the items, respondents were answering in a fairly homogeneous fashion. For instance, most of the respondents might answer a given cognitive item correctly and, for an affective item, most respondents might indicate agreement with the opinion expressed in that item. The consequence of these response patterns is low item variances. Low item variances, in turn, result in differential and artificial

attenuation of elements in the interitem correlation matrix and tend to introduce biases into the factor analysis. A procedure suggested by Gorsuch (1974) was used to make the variances across items more homogeneous. This procedure involves augmenting the data matrix with its inverse. In other words, a "mirror image" respondent is created for each "real" respondent. The result is that the distribution of responses tends to be spread evenly across the possible range of responses for each item. The mirror image response and the real response lie the same distance from the midpoint of the item scale but in opposite directions. For instance, a response of 3 on an affective item having a four-point scale would have a mirror image response of 2; response of 2 to a cognitive item which has just a two-point scale would have a mirror image response of 1. Consequently, when the responses of the augmented data matrix are averaged, all the cognitive items have a mean of 1.5, items with a three-point scale have a mean of 2, and items using a four-point scale have a mean of 2.5. In addition, the variances of the cognitive items which have two-point scales will be necessarily the same. For items with more than a two-point scale, although the variances will tend to be homogeneous, there is no guarantee of equivalence. The effect of this procedure is the construction of a correlation matrix free from biases inherent in any items with a restricted response range. At the same time, of course, augmenting the data matrix with its inverse still preserves the basic "pattern" of relationships that exists between the responses to the various items.

The correlation matrices were computed from the augmented data matrices for each of the three grade levels and were submitted to the factor analysis procedure. An upper limit of seven factors in each of the two sets was set on the number of factors that could be extracted. The transferability criterion was given particularly heavy emphasis with respect to searching for constructs that spanned all grade levels where the component items had been administered. Although no formal coefficient of transferability was computed, the consistent presence of certain items with high factor loadings was considered sufficient evidence to indicate that the same construct was present throughout the grades. Coefficients of homogeneity were calculated using standard coefficient alpha reliability formulas.

To facilitate the use of these constructs in future local evaluations, unweighted, unstandardized item scores were used to calculate the construct scores. Items with a corresponding positive entry in the factor estimation matrix were added together; items with corresponding negative entries in the factor estimation matrix were subtracted. Recent research suggests that using a unit weighting procedure, rather than regression weights, for the factor estimation matrix does not alter substantially the nature of the factor scores that are produced. Consequently, we performed homogeneity analyses on the raw scores, weighted only by a positive or negative unity. Finally, all learner outcome construct scores were scaled so that higher scores would indicate more of the particular construct.

In addition to the learner outcome battery, student outcome was also measured in the affective domain by the Self Observation

Scales (SOS). The SOS is comprised of seven different measures (previously defined by factor analysis of the norming data). These measures were input to a second-order factor analysis to reduce the outcome variables to a more concise set of constructs, thus aiding in the interpretability of the results. Unlike the learner outcome constructs, the SOS construct scores were computed using the factor analytically derived regression weights (from the factor estimation matrix) applied to standardized scores. Since the SOS can be scored only by the publisher, this does not represent a substantial limitation on local projects with respect to using the SOS in future evaluations.

The third instrument submitted to the construct definition procedure was the Teacher/Counselor/Administrator Value Internalization section of their respective Survey Forms. One of the purposes of the study was to examine the effects of implementation/process variances on opinions regarding career education; further, any effect was more likely to be reflected in opinion constructs than in the individual items. Since all three groups responded to the same questionnaire, the teacher, counselor, and administrator data were pooled for input to the factor analysis. A limit of four was set on the number of factors to be extracted. As with SOS, the opinion constructs were scored using the factor analytically derived regression weights applied to standardized scores. For the benefit of local evaluators, these item weights are included in Chapter 5.

Throughout all of the construct definition procedures in this study, we adopted a fairly conservative approach to the rejection of factors. This was motivated by the ever present

concern in construct definition that the "baby will be thrown out with the bathwater." In all likelihood, only unique and error variance are being removed by the factor analysis. The research of Morris and Guertin (1977) suggests, for instance, that factor scores as predictors lead to a higher level of prediction in a cross-validation sample than does the use of data-level variables. Nonetheless, if inclusion of a factor in the study is still in question after application of the criteria previously described, the tendency was to retain it rather than overlook outcome constructs which might be sensitive to treatment.

4

INSTRUMENTATION

The complex nature of this evaluation reflected the program's complexities and was reflected in turn by the wide variety of instruments utilized. Information needs existed in three variable sets: determinants of implementation, implementation/process, and outcome. Sources for this information included five groups: students, teachers, counselors, building level administrators, and local project staff. All the instruments used in this study were described in Chapter 2, Volume II of this report; this chapter, accordingly, provides added detail for only those instruments on which the intrinsic definition procedures described in the previous chapter were used. The main emphases in this chapter are on the selection of the student learner outcome instruments used in the study and the development of the teacher, counselor, and principal Career Education Value Internalization items. Chapter 5 presents the construct definition results for these instruments. The instruments themselves can be found in Appendix B to Volume II of this report.

Student Outcome Instruments

One objective included in virtually all career education programs, regardless of their complexity, is student performance improvement. The selection of appropriate measures of these performances becomes, therefore, a critical element in any evaluation, particularly in evaluations involving geographically diverse school systems which utilize a variety of career education process strategies to improve student performance.

The selection of outcome instrumentation for this evaluation relied heavily on content analysis to ensure coverage across the OE learner outcomes. Unfortunately, psychometric data on the majority of career education instruments were frequently insufficient to support a decision on whether an instrument purporting to measure a learner outcome did in fact measure that outcome.

Unlike implementation/process evaluation instruments, many outcome evaluation instruments are available commercially. Such instruments include, among others, standardized achievement tests, criterion-referenced achievement tests, and aptitude tests. This section addresses the methodology used in selecting the instruments, including descriptions of the selection criteria used, the review procedures, the results of the review procedures, and brief summaries of each of the selected instruments.

Selection Criteria

Two major topics were considered in determining the criteria for selecting the learner outcome measures: measurement integrity

and practicality. Traditionally, two criteria have been employed in ascertaining measurement integrity: validity and reliability Simply stated, validity refers to the extent to which an instrument measures what it is intended to measure, and reliability refers to the extent to which it does so consistently. Although an instrument might be valid and reliable, if it is not also practical from the standpoints of appropriateness to grade level, length, cost, administration, scoring, and interpretation, it is of lessened utility.

Review Procedures

The evaluation design called for administering instruments to a sample of students at three grade levels (5,8,11) across fifteen local projects in order to estimate treatment effect; further, it was necessary to select criterion measures for seven of the nine learner outcomes. The learner outcome of Placement is included in the longitudinal designs developed for each project and was not, therefore, a focus of this evaluation. Another learner outcome, Basic Skills, was measured by the achievement tests used routinely in the school districts' testing programs. The scores on these tests were converted to normalized T scores in order to compare scores across projects.

Each of the instruments listed in A Functional Guide to Evaluating Career Education (prepared by Development Associates, Inc., for the U.S. Department of Health, Education and Welfare in September, 1975) was ordered and compiled into a test file. A search for other instrumentation, possibly developed subsequent

to publication of the Guide, was conducted by contacting various people known to be working in this content area. Other sources of instrumentation were the selected project sites. At the conclusion of this search, twenty-seven instruments purporting to measure one or more of the seven learner outcomes were available for review. A list of these instruments is presented Table 4.1.

The following outline was used by the evaluation team for reviewing these twenty-seven instruments:

1. Practicality
   a. Appropriateness to grade level (e.g., readability)
   b. Length of administration time
   c. Cost
   d. Administration
   e. Scoring
   f. Ease of interpretation
   g. Coverage of learner outcomes
   h. Coverage of comparable learner outcomes across grades (i.e., level articulation)
2. Measurement Integrity
   a. Validity
   b. Reliability

Results of the Review Procedures

The review of potential student outcome measures was conducted during August, 1976. On initial inspection of the tests related to the learner outcomes, several instruments were eliminated as unsuitable based on two or more of the major criteria in the reviewing outline. The next step in the review process was to divide the tests according to grade level coverage. Those instruments which purported to be appropriate for all three grade levels were grouped together, as were those appropriate only at one or two levels. Many of the instruments were judged to be appropriate at the upper grade levels but were inappropriate for fifth graders.

Table 4.1

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After the instruments had been divided in this fashion, they were reviewed for readability. Most of the tests were found to be appropriate for most students in grades eight and eleven, when the vocabulary, reading comprehension levels, and the anticipated variability of student reading achievement across the fifteen project sites were considered.

Test validity was examined in order to determine whether or not the instrument had content validity, criterion validity and construct validity. Most of the instruments reviewed were composed of numerous scales or subtests, each purporting to measure a recognized aspect of career education. The technical manual for each instrument was examined for application of professionally accepted methods for estimating test and scale reliabilities, indices of stability, and measurement validity. With respect to scales within tests, item intercorrelations and estimates of internal consistency were sought. Where such data were available, the evaluation team judged the acceptability of the reliability estimates.

These efforts produced largely unsatisfactory results; due to the infancy of career education measurement theory and practice, most of the instruments reviewed lacked sufficient information to permit a careful validity check. The review process became, as a result, a matter of having to use subjective judgments; final decisions on instrument selection were based on the face validity of the items plus a tabulation of the number of items within each instrument which were designed to measure each of the learner outcomes in question.

The instruments selected as a result of the entire procedure were the Program of Exploration in Career Education Knowledge test, the New Mexico Statewide Evaluation Program Test Series and the Ohio Career Development test. A previous study by NTS revealed that measurement of the learner outcome related to self-concept could best be achieved by using the Self Observation Scales. Accordingly, the decision was made to use this instrument for measuring that outcome. Table 4.2 presents a matrix indicating each of the learner outcomes, the instruments proposed for use in measuring that outcome, and the number of items appropriate in terms of content validity, for measuring that outcome at each of the three grade levels. It should be noted that Table 4.2 lists the expected coverage, actual item-construct relationships are detailed in Chapter 5. Figures 4.1 through 4.11 present brief summaries of each of the instruments selected for this study.

Table 4.2

Analysis of Instruments by Expected Coverage of Learner Outcomes

	Outcome	Grade 5 Name	# Items	Grade 8 Name	# Items	Grade 11 Name	# Items
1.	Basic Skills	Achievement Test routinely used in the school system		Achievement Test routinely used in the school system		Achievement Test routinely used in the school system	
2.	Good Work Habits	Ohio 6 *	10	Ohio 8	8	Ohio 10	12
						NM 5008	25
		PECE **	5	PECE	5	PECE	5
3.	Work Values	Ohio 6	15	Ohio 8	8	Ohio 10	17
		NM 5001 ***	25	NM 5001	25	NM 5001	25
		PECE	6	PECE	6	PECE	6
4.	Job Hunting	Ohio 6	1	Ohio 8	8	Ohio 10	4
						NM 5007	20
		PECE	8	PECE	8	PECE	8
5.	Career Decision Making	Ohio 6	11	Ohio 8	23	Ohio 10	14
				NM 5006	20	NM 5006	20
		PECE	11	PECE	11	PECE	11
6.	Continuing Education	Ohio 6	4	Ohio 8	3	Ohio 10	6
						NM 5002	20
		PECE	20	PECE	20	PECE	20
7.	Placement					(To be included in the longitudinal design implemented by projects in subsequent years)	
8.	Self Concept	SOS****	60	SOS	72	SOS	72
9.	Career Awareness	Ohio 6	25	Ohio 8	12	Ohio 10	14
		PECE	25	PECE	25	PECE	25
	TOTAL ITEMS BY GRADE		228		262		327

* Ohio Career Development Test Series
** Program of Exploration in Career Education Knowledge Test
*** New Mexico Statewide Evaluation Program Test Series
**** Self-Observation Scales

FIGURE 4.1

Name of Test: New Mexico Statewide Evaluation Program Test 5001

Author: Evaluation, Assessment and Testing Unit, State of New Mexico, Department of Education

Age: The test was developed through administration to students in Grades 6, 9 and 12.

Variable: Significance of Work

Type of Measure: A paper and pencil, multiple-choice format, with test items contained in a booklet and student answers recorded on a machine scoreable answer sheet

Reliability Estimate: Not applicable

Source: Westinghouse Learning Corp., Sunnyvale, California

Description of Measure: The test consists of 25 opinion items. The mode of response is a four-point Likert-type scale. Item statements center on importance of work, preparing for work and benefits of work.

The items and reading ability required appear to be appropriate for fifth, eighth and eleventh grade classrooms.

SAMPLE ITEM

Being successful in a career is a chance to gain some personal satisfaction.

a. Strongly agree

b. Agree

c. Disagree

d. Strongly disagree

FIGURE 4.2

Name of Test: New Mexico Statewide Evaluation Program Test 5002

Author: Evaluation, Assessment and Testing Unit, State of New Mexico, Department of Education

Age: The test was developed through administration to students in Grades 6, 9 and 12.

Variable: Continuing Education.

Type of Measure: A paper and pencil, multiple-choice format, with test items contained in a booklet and student answers recorded on a machine scoreable answer sheet

Reliability Estimate: K-R#20=0.628; s.e. measurement=0.110; N=750

Source: Westinghouse Learning Corp., Sunnyvale, California

Description of Measure: The test consists of 20 items related to job supply and demand, reliable sources of information and order to consult for information.

The majority of the items are in story form, describing a youth facing some dilemma about future education, training or job choice. Each item is followed by four alternatives, from which the respondent selects the best information source or action alternative.

SAMPLE ITEM

Virginia thinks she wants to be an artist or a teacher. She is an 11th grader and is a B student. In addition to her required courses, Virginia is taking some art courses. Darken the space that represents the BEST ORDER OF SOURCES FOR VIRGINIA TO CONSULT FOR THE INFORMATION SHE NEEDS.

a. Her friends, her parents, her counselors and the Occupational Outlook Handbook

b. Her counselors, her friends, the Occupational Outlook Handbook and her parents

c. Her counselors, the Occupational Outlook Handbook, her parents and her friends

d. Her counselors, her friends, her parents and the Occupational Outlook Handbook

FIGURE 4.3

Name of Test: New Mexico Statewide Evaluation Program Test 5003

Author: Evaluation, Assessment, and Testing Unit, State of New Mexico, Department of Education

Age: The test was developed through administration to students in Grades 6, 9 and 12.

Variable: Job Characteristics

Type of Measure: A paper and pencil, multiple-choice format, with test items contained in a booklet and student answers recorded on a machine scoreable answer sheet

Reliability Estimate: K-R#20=0.707; s.e. measurement=0.109; N=750

Source: Westinghouse Learning Corp., Sunnyvale, California

Description of Measure: This test contains 20 items portraying hypothetical students with various needs, interests and characteristics. The respondent is asked to identify the most appropriate job characteristics, job environment, necessary training and education and career advancement indicants of salary.

A number of the items are somewhat lengthy, and vocational vocabulary is used. The content suggests the test is geared toward secondary students.

The test contains a few sex-stereotyped occupational denotations, such as salesman (instead of salesperson) and stewardess (instead of flight attendant.)

SAMPLE ITEM

Linda makes good grades. She enjoys helping people and she has been a volunteer in nursery school and in the hospital. Her best subjects have been sociology and psychology. What occupation would suit her BEST?

a. Social Worker

b. Science Teacher

c. Stewardess

d. Physician

FIGURE 4.4

Name of Test: New Mexico Statewide Evaluation Program Test 5006

Author: Evaluation Assessment and Testing Unit, State of New Mexico, Department of Education

Age: The test was developed through administration to students in Grades 6, 9 and 12.

Variable: Decisionmaking Choices

Type of Measure: A paper and pencil, multiple-choice format, with test items contained in a booklet and student answers recorded on a machine scoreable answer sheet

Reliability Estimate: K-R#20=0.861; s.e. measurement=0.152; N=750

Source: Westinghouse Learning Corp., Sunnyvale, California

Description of Measure: The test consists of 20 combination-type items. Some relate to definitional knowledge of career choice; others portray hypothetical students facing educational and occupational choice dilemmas.

The respondent is asked to select the optimal course of action. An additional set of items calls for the respondent to identify specific steps to be taken in making occupational decisions.

The content is geared more toward the secondary than elementary level. The reading difficulty of the items is not great, but the multiple-choice responses are complex in several cases.

SAMPLE ITEM

During the past several years I have:

a. Gone to my counselor and have taken various courses that have helped decide the kind of occupation I plan to enter after graduating from high school.

b. Gone to my counselor and engaged in different kinds of activities that have helped me decide the type of education I will try to obtain after graduating from high school

c. Done BOTH of the above.

d. Done NONE of the above.

FIGURE 4.5

Name of Test: New Mexico Statewide Evaluation Program Test 5007

Author: Evaluation, Assessment and Testing Unit, State of New Mexico, Department of Education

Age: The test was developed through administration to students in Grades 6, 9 and 12.

Variable: Applying For a Job

Type of Measure: A paper and pencil, multiple-choice format, with test items contained in a booklet and student answers recorded on a machine scoreable answer sheet

Reliability Estimate: K-R#20=0.698; s.e. measurement=0.120; N=750

Source: Westinghouse Learning Corp., Sunnyvale, California

Description of Measure: This instrument contains 20 items related to making job inquiries, completing application blanks and "do's" and "dont's" of job interviews.

The items consist of situations featuring hypothetical persons, hypothetical interview and application situations and facsimiles of application forms.

The content and interest level is pitched toward the secondary school rather than the elementary school. The vocabulary level is not difficult, though several of the situations are lengthy. The occupational vocabulary appears within the word recognition and comprehension range of students in grade 11.

SAMPLE ITEM

If an employment application asked you to list your "previous employment" but you have never had any jobs like the one you are applying for, you should:

a. Write "None."

b. Writing "Nothing Applicable."

c. List the jobs you have had.

d. Make up some appropriate jobs and list them.

FIGURE 4.6

Name of Test: New Mexico Statewide Evaluation Program Test 5008

Author: Evaluation Assessment and Testing Unit, State of New Mexico, Department of Education

Age: The test was developed through administration to students in Grades 6, 9 and 12.

Variable: Job Advancement

Type of Measure: A paper and pencil, multiple-choice format. Test items are contained in a booklet and student answers are recorded on a machine scoreable answer sheet.

Reliability Estimate: K-R#20=0.813; s.e. measurement=0.144; N=750

Source: Westinghouse Learning Corp., Sunnyvale, California

Description of Measure: The test consists of 25 items related to maintaining a job, advancing in a job, attitudes toward success, effect of quality work and important factors to advance in an occupation.

The items are presented in story and scenario form describing employees facing dilemmas stemming from work attitudes and behaviors, or revolving about continuing education and career advancement.

SAMPLE ITEM

John, a young bookkeeper, is progressing toward his career goal as an accountant. Which of the following behaviors will contribute MOST to his possibilities of being promoted?

a. He is enrolled in a college trigonometry course.

b. He works on weekends as a shoe salesman.

c. He expresses new, useful ideas at his bookkeeping job.

d. He often expresses his wish to become an accountant.

FIGURE 4.7

Name of Test: The Program of Exploration In Career Education Knowledge Test (PECE)

Author: Georgia State Department of Vocational Education; original 100-item test, revised into 75-item test by William D. Myrick and Joan Z. Weiss, May, 1971.

Age: The test was developed for administration to students in Grades 5-12.

Variable: Knowledge of occupations, occupational requirements, and occupational environments.

Type of Measure: A paper and pencil instrument with items in booklet form and a separate machine scoreable answer sheet

Reliability Data:

Grade	N	K-R#20
6	91	.85
7	95	.86
8	89	.87
9	92	.89
10	114	.84
11	80	.84
12	75	.87

Validity Data: The PECE Test was found to correlate (zero order) positively with intelligence test data.

Source: Center for Occupational Education, North Carolina State University, Raleigh, North Carolina

Description of Measure: The test consists of 75 items (19 matching, 27 true-false, and 29 multiple-choice) relating to such things as career awareness, career training and career decisionmaking. It could be said to render an approximate measure of a student's level of sophistication in matters pertaining to the world of work.

SAMPLE ITEM

Which of the following persons would have least authority in his job?

a. Branch President
b. School Principal
c. Teacher
d. Plant Manager

FIGURE 4.8

Name of Test: Ohio Career Development - Grade 6

Author: Policy Studies in Education

Age: The test was developed for administration to students in Grade 6.

Variable: Identifying student knowledge about occupational characteristics, work habits and values.

Type of Measure: A paper and pencil, multiple-choice format with test items contained in a booklet. Student answers are recorded on a machine scoreable answer sheet.

Source: Education Research Council of America

Description of Measure: The instrument consists of 70 items. Thirty-five relate to career awareness, decision-making, work habits and values, economic knowledge and continuing education. Thirty-five items center on job acquisition and maintenance.

Most of the items are short and expressed in language which could be understood by either fifth or sixth grade students.

SAMPLE ITEM

Mr. Roberts is hired by a furniture company. He is _____ of the company.

a. A customer
b. An employee
c. An employer
d. An owner

FIGURE 4.9

Name of Test: Ohio Career Development - Grade 8

Author: Policy Studies in Education

Age: The test was developed for administration to students in Grade 8.

Variable: Identifying student knowledge about occupational characteristics, work habits and values, job hunting skills

Type of Measure: A paper and pencil, multiple-choice format with test items contained in a booklet. Student answers are recorded within the machine scoreable booklet.

Source: Educational Research Council of America

Description of Measure: The instrument consists of sixty-eight items. Thirty-four relate to students' career awareness, career decisions, economic knowledge, continuing education and job hunting. Thirty-four items concern attitude toward school, work values, and self concept.

The length of the items and level of language used in the instrument make it appropriate for use with seventh as well as eighth grade students.

Several of the items from the 6th grade form are also used in the 8th grade form.

SAMPLE ITEM

If you had only a little money, which should you pay for last?

a. Food

b. Shelter

c. Recreation

d. Clothing

FIGURE 4.10

Name of Test: Ohio Career Development - Grade 10

Author: Policy Studies in Education

Age: The test was developed for administration to students in Grade 10.

Variable: Student knowledge of occupational characteristics, work habits and values, job hunting skills

Type of Measure: A paper and pencil, multiple-choice format with test items contained in a booklet. Student answers are recorded in the consumable, machine scoreable booklet.

Source: Educational Research Council of America

Description of Measure: The instrument consists of sixty-eight items. Thirty-four relate to students' career awareness, career decisionmaking skills, work habits and values, knowledge of the economic system, use and necessity for continuing education and job hunting skills, and thirty-four concern attitudes toward school and work.

There is an overlap of items with those contained in the 8th grade form. The readability and language level used make this instrument appropriate for use with 9th, 10th or 11th grade students.

SAMPLE ITEM

A decision is hard to make when you

a. Have a lot of time.

b. Can ask advice.

c. Have a lot of money.

d. Don't have all the facts.

FIGURE 4.11

Name of Test: Self Observation Scales

Authors: A. Jackson Stenner and William G. Katzenmeyer

Age: Four Levels: Primary, Grades K-3;
Intermediate, Grades 4-6;
Junior High, Grades 7-9;
Senior High, Grades 10-12.

Type of Measure: A paper and pencil, forced choice format, with test items contained on a machine scoreable answer sheet for grades 4-12. The questions are read to the students in grades K-3 with their responses recorded on machine readable answer sheets.

Reliability Estimate: Test/Retest = ranges from .73 to .88

Source: National Testing Service, Inc., Durham, N. Carolina

Description of Measure: The nationally normed instrument consists of from 50 to 72 items, dependent upon grade level. It is a direct, self-report, group administered instrument with empirically determined scales which measure the way students perceive themselves and their relationships. Self acceptance, self security and school affiliation are measured at all levels. The other scales vary by level and include social maturity, social confidence, teacher affiliation, peer affiliation and self assertion.

SAMPLE ITEMS

I think I will be successful in life.

Yes____ No____

I worry about losing my friends.

Yes____ No____

Teacher, Counselor, and Principal Career Education Value Internalization Items

Value Internalization was judged by the evaluation team to be a critical variable set for determining the quality of implementation of career education in the fifteen projects. Measuring value internalization is, however, not an easy task. Although it is quite easy to write up some opinion items which, on the basis of their content validity, appear to be tapping opinions toward career education, it is much more difficult to develop items that actually do so. Nonetheless, as no commercially available instruments existed which would both measure the necessary opinions and which also had been validated adequately, NTS found it necessary to attempt to develop such an instrument.

The forty Likert items which appeared on the final survey forms used for teachers, counselors, and principals were the result of an extensive and iterative writing, review, and revision process. Well over one hundred items were developed for the original item pool. These items were based on reviews of relevant career education literature and on the substance of the evaluation questions which emerged from the design conferences.

Following internal review and revision, all remaining items were submitted to OCE and project staff for comments. This review led to the elimination of some items, the addition of others, and revisions of still others. This new item pool was revised further by the evaluation team to insure (1) broad coverage of career education concepts without excessive redundancy and (2) a rough balance between negatively and positively valued items

across the questionnaire and within each concept area. As Table 4.3 shows, NTS was successful in meeting these objectives. The items fell into nine content-based categories. There is a rough equivalence of pro-career education and anti-career education items in each category and, further, the total number of these positively and negatively valued items is the same.

Table 4.3

STRUCTURE OF CAREER EDUCATION OPINION QUESTIONNAIRE

Category of Opinion	Positively Valenced or Pro-Career Education Items	Negatively Valenced or Anti-Career Education Items
Meaning of career education	36*	5, 23
Importance/meaning of work	14, 32	10, 28, 40
Potential student outcomes from career education	1,11,17,18,27,37	9,16,21,25,30
Potential school/staff benefits from career education	6, 20	39
Staff roles/staff development in career education	3, 4, 38	8, 22, 34
Infusion in career education	26, 35	7, 19
Role of parents in career education	33	2
Role of community in career education	15, 31	12, 24
Need for resources to implement career education	13	29
TOTALS:	20 items	20 items

*These numbers denote the respective item numbers on the Opinion Section of the Teacher, Counselor, and Principal Survey Forms.

5

RESULTS OF THE SUBSTUDY

The construct definition procedures described in Chapter 3, were applied to three sets of instruments: The learner outcome battery, the Self Observation Scales (SOS), and the Career Education Value Internalization item set, designed to measure opinions about career education held by practitioners.

The learner outcome battery was divided into cognitive and affective items. Each set was submitted separately to factor analysis at each grade level; the results of the six factor analyses are described in the following section.

The principal components analysis of the grade five affective items produced three eigenvalues greater than one, while the corresponding factors accounted for forty-two percent of the total variance. The next factor extracted accounted for only an additional one percent. This indicated that the remaining fifty-eight percent of the total variance that was not accounted for by the first three factors was probably attributable to measurement error and characteristics unique to each of the students. Thus, no common factors would exist to account for this variance. The principal components analysis of the grade eight affective items produced four eigenvalues greater than one, with the four related factors

accounting for forty-two percent of the variance. A fifth factor accounted for only an additional one-half percent of the total variance. The principal components analysis of the grade eleven affective items produced three eigenvalues greater than one, although the fourth had a value of .93. The first four factors accounted for fifty-one percent of the total variance; the fifth factor accounted for less than one percent of the variance. The content of the factors was then examined; for this, the items having the highest loading on each factor were grouped together and the substance of the individual items inspected.

The affective factor structures at all three grades were highly similar. The items with the highest loadings on each factor are presented in Tables 5.1, 5.2, and 5.3. (The other information on these tables will be discussed shortly). The construct "attitude towards work" included Items 1 and 6 from the New Mexico Test 5001 at all three grade levels. The construct "interest in career preparation" included the last five items from the New Mexico Test 5006 in grades eight and eleven. (The New Mexico 5006 was not administered to fifth grade students). The construct "work values" included Items 10, 11, and 21 from the New Mexico Test 5001 in both grades eight and eleven. Even though these items did not appear as having high loading for the New Mexico Test 5001 in grade five, the New Mexico Test 5001 constituted what appeared to be a work values factor in the fifth grade. Finally, a factor characterized almost exclusively by items from the second part of the Ohio test appeared in all three grades. The Ohio tests' items varied from grade to grade; nonetheless, their appearance as a single factor indicated the

Table 5.1

Grade 5: Construct Labels, # Items, Sample Items, and Homogeneities

Construct Label	# Items	Items	Homogeneity	Construct Scores			Item Variances			Pre/Post Invariance	Black/White Invariance	Construct Differentiation Index
				Possible Range	Mean	S.D.	Mean	Min.	Max.			
Occupational Self-Awareness	25	Ohio, Part 2 (3,7,8, 16,34) New Mexico 1 (7,10)	.73	-27 to 31	16.2	6.6	.53	.22	.82	.844	.718	596
Work Values	11	New Mexico 1 (15,16, 21,23,24)	.62	11 to 44	33.8	4.3	.73	.46	1.03	.735	.744	500
Attitudes Towards Work	14	New Mexico 1 (1,3,6) Ohio, Part 2 (13,17,20)	.70	10 to 38	27.2	5.5	.76	.59	1.13	.783	.744	547
Knowledge of Work Values	23	PECE (17,23,35,40,46)	.75	23 to 46	38.6	4.1	.21	.14	.25	.782	.402	585
Decision Making	35	Ohio, Part 1 (12,17,18,31) PECE (16,54,55)	.78	35 to 70	48.6	5.8	.23	.13	.25	.569	.537	595
Job Seeking/Job Getting	12	Ohio, Part 1 (4,9,10, 11,14)	.63	12 to 24	19.7	2.6	.22	.14	.25	.685	.017	1118
Economic Awareness	6	PECE (47,59,62,63,68)	.62	6 to 12	8.4	1.7	.24	.21	.25	.931	.703	1214
Test												
Ohio, Part 2	35		.57									
New Mexico 1	25		.75									
Ohio, Part 1	35		.73									
PECE	75		.78									

Table 5.2

Grade 8:Construct Labels, # Items, Sample Items, and Homogeneities

Construct Label	# Items	Items	Homogeneity	Construct Scores			Item Variances			Pre/Post Invariance	Black/White Invariance	Construct Differentiation Index
				Possible Range	Mean	S.D.	Mean	Min.	Max.			
Occupational Self-Awareness	26	Ohio, Part 2 (2,9,10, 15,30)	.81	-18 to 4	21.4	7.9	.53	.34	.79	.854	.725	283
Work Values	21	New Mexico 1 (10,11,14, 21,23)	.81	20.5 to 82.5	63.6	7.6	.64	.28	1.05	.877	.721	294
Interest in Career Preparation	9	New Mexico 6 (16,17,18, 19,20)	.73	4.5 to 22.5	10.8	3.5	.47	.41	.52	1.000	1.000	298
Attitudes Towards Work	5	New Mexico 1 (1,6,13) Ohio, Part 2 (26,33)	.40	5 to 18	12.0	2.3	.71	.61	.82	.346	.091	1279
Knowledge of Work Values	42	PBCB (8,17,23,35,46)	.90	4.2 to 84	71.3	8.3	.20	.09	.25	.608	.619	493
Decision Making	8	New Mexico 6 (1,3,5,7,10)	.65	8 to 16	12.6	2.1	.24	.22	.25	.891	.211	450
Job Seeking/Job Getting	22	Ohio, Part 1 (11,15,17,32) PBCB (7,56,68)	.63	22 to 44	30.2	3.5	.22	.15	.25	.857	.092	601
Career Awareness	20	Ohio, Part 1 (10,14,16, 25,34)	.83	20 to 40	32.3	4.7	.23	.17	.25	.972	.723	590
Economic Awareness	5	PBCB (48,59,60,63,68)	.47	5 to 10	7.2	1.4	.24	.23	.25	.732	.513	1330
Test												
Ohio, Part 2	34		.36									
New Mexico 1	25		.79									
New Mexico 6	10		.71									
Ohio, Part 1	34		.83									
PBCB	75		.88									
New mexico 6 (1-10)	10		.66									

Table 5.3

Grade 11: Construct Labels, # Items, Sample Items, and Homogeneities

Construct Label	# Items	Items	Homogeneity	Construct Score			Item Variances			Pre/Post Invariance	Black/White Invariance	Construct Differentiation Index
				Possible Range	Mean	S.D.	Mean	Min.	Max.			
Occupational Self-Awareness	28	Ohio, Part 2 (3,8,9, 10,19)	.78	-44 to 12	3.0	6.4	.36	.12	.57	1.000	.984	277
Work Values	21	New Mexico 1 (10,11,12, 17,21)	.81	20.5 to 82.5	65.4	6.4	.44	.19	.78	.896	.901	294
Interest in Career Preparation	8	New Mexico 6 (16,17,18, 19,20)	.75	4 to 20	10.8	3.5	.52	.46	.57	1.000	1.000	298
Attitudes Towards Work	3	New Mexico 1 (1,6,13)	.45	3 to 12	7.9	1.7	.65	.61	.70	.906	.333	1279
Knowledge of Work Values	46	PECE (17,35,36,40,46)	.90	46 to 92	83.7	7.3	.14	.04	.24	.873	.689	493
Decision Making	61	New Mexico 2 (6,13) New Mexico 6 (3,10) New Mexico 7 (14,18) New Mexico 8 (5,9)	.95	61 to 122	102.0	13.6	.21	.12	.25	.723	.747	450
Job Seeking/Job Getting	17	Ohio, Part 1 (2,5,11,14) PECE (50,58,64)	.75	17 to 34	25.1	3.7	.24	.22	.25	.676	.131	601
Career Awareness	15	Ohio, Part 1 (3,8,13,16, 27)	.83	15 to 30	25.8	3.6	.20	.13	.24	.869	.038	590
Economic Awareness	3	PECE (59,63,68)	.45	3 to 6	4.7	1.0	.24	.23	.25	.569	.449	1330
Test												
Ohio, Part 2	34		.46									
New Mexico 1	25		.81									
New Mexico 6 (11-20)	10		.73									
Ohio, Part 1	34		.82									
PECE	75		.89									
New Mexico 6 (1-10)	10		.73									
New Mexico 2,7,8	65		.94									

presence of the same construct at all three grade levels. The high transferability of these factors, coupled with the analysis of the eigenvalues and the proportion of total variance explained, indicated that these four factors represented all the important constructs underlying the responses to the affective set of the learner outcome battery.

The first factor included the following high loading items:

- All sixth graders should like the same sports (grade 5)
- A good worker is someone who sticks to a job even if it is hard (grade 5)
- A person who often gets angry when working with others is probably one who would rather work alone (grade 5)
- Hobbies can often lead to career choices (grade 8)
- Disappointment is a feeling that only children and teenagers experience (grade 8)
- Learning about yourself has a lot to do with career choice choice (grade 8)
- A good attitude on a job can help your chances for a promotion (grade 11)
- Before making decisions, students should have an understanding of their own value systems (grade 11)
- Part of decisionmaking is being able to be proud of your own decisions afterwards (grade 11)

Although the content of these items is, by no means, univocal, they all tend to pertain to the relationship between self-perception and the world of work. Consequently, the construct was labeled "Occupational Self-Awareness."

The next factor contained the following items with high factor loadings:

- We have a good standard of living because every worker does his or her fair share
- It is a sign of maturity to devote appropriate attention to preparing for a job

- I respect people who are serious about preparing for work
- Only fools work hard at their jobs

All of these items seem to describe moral or ethical positions that one should have within the world of work. Consequently, we labeled the construct "Work Values."

The next factor consisted exclusively of items from the second part of the New Mexico Test 5006. Each of these items described two activities related to career preparations and asked the respondent to indicate whether he/she has done neither, one, or both of them. A typical item is: During the past year I have (a) learned the cost of training for the occupation in which I am interested, (b) learned how much study and experience is necessary to enter the occupation of interest to me, (c) done both of the above, or (d) done none of the above." While these items, in and of themselves, are not directly attitudinal, they do measure the level of activity expended in career preparation. Consequently they were taken to represent a measure of involvement in career preparation, and the construct was labeled "Interest in Career Preparation."

The fourth factor included the following three items across all three grades:

- People seldom use what they learn in school on the job
- Success in most jobs is not related to how well one does in training for the job
- Most works are not able to earn enough money to be happy

All of these items seem to relate to a general ennui regarding the fruitfulness of pursuing a career. Consequently, the construct was labeled "Attitudes Toward Work." This construct is related to attitudes about the concepts of work rather than

attitudes which should be held while engaged in work, a construct measured by "work values."

The homogeneity of the items for each construct was then computed and examined. In addition, the effect of each item on the construct's homogeneity was measured by computing the homogeneity of the construct with each item deleted. This information was used to remove certain items so that the remaining set would possess the highest homogeneity possible. The final homogeneities for each construct are reported in Tables 5.1, 5.2, and 5.3, along with the number of items that comprised each construct. (An enumeration of the items associated with each construct appears in Tables 5.4, 5.5, and 5.6). It should be noted that negative signs appear next to some of the item numbers in these tables. This is to indicate that these items were subtracted rather than added in the computation of the construct score.

In addition to the homogeneities, Tables 5.1, 5.2, and 5.3 also contain the possible range of scores for each of the constructs, the mean and standard deviation of the constructs, and the averages and ranges of the variances of the items contributing to each of the constructs. The range of possible scores for each construct is based on the individual item scoring procedures described in Chapter 3. Examination of the means indicated that, at least for the random sample upon which the reliabilities were computed, the means were located in approximately the middle of the possible score range. The item variance information has been included as an indication of the heterogeneity of the responses with respect to the various items. In general, the variability of students' responses indicates wide diversity of attitudes and opinions. Consequently, the Gorsuch procedure (described in

Table 5.4

Learner Outcome Construct Items

Grade 5

Occupational Self-Awareness

Ohio, Part 2: -2, 3, -4, -5, -6, 7 -8, -9, -12, -16, 18, -22, -28, -29, 30, -34, -35

New Mexico 5001: 2, 5, 7, 8, 9, 10, 11, 12

Work Values

New Mexico 5001: 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25

Attitudes Towards Work

Ohio, Part 2: 10, 13, 17, 20, 21, 23, -24

New Mexico 5001: 1, 3, 6

Knowledge of Work Values

PECE: 8, 14, 17, 19, 20, 22, 23, 26, 27, 29, 31, 32, 34, 35, 36, 37, 38, 40, 46, 51, 66, 69, 70

Job Seeking/Job Getting

Ohio, Part 1: 7, 12, 15, 17, 18, 19, 21, 23, 24, 26, 27, 28, 29, 30, 31, 34, 35

PECE: 10, 11, 12, 13, 15, 16, 18, 25, 28, 45, 48, 52, 54 55, 60, 61, 71, 73

Career Awareness

Ohio, Part 1: 1, 2, 3, 4, 6, 8, 9, 10, 11, 14, 25, 32

Economic Awareness

PECE: 47, 49, 59, 62, 63, 68

Table 5.5

Learner Outcome Construct Items

Grade 8

Occupational Self-Awareness

Ohio, Part 2: 2, 3, 4, -5, 6, 7, -9, 10, 11, -13, -14, 15, 16, -17, -18, 19, 20, -21, 22, 25, 27, 28, -29, -30, -31, -32

Work Values

New Mexico 5001: 2, 3, 5, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25

New Mexico 5006: 11

Interest in Career Preparation

New Mexico 5006: 12, 13, 14, 15, 16, 17, 18, 19, 20

Attitudes Towards Work

Ohio, Part 2: 26, 33

New Mexico 5001: 1, 6, 13

Knowledge of Work Values

Ohio, Part 1: 8

PECE: 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 25, 26, 27, 29, 33, 34, 35, 36, 37, 38, 40, 43, 45, 46, 47, 49, 51, 52, 54, 55, 61, 62, 66, 69, 70, 71

Decision Making

New Mexico 5006: 1, 3, 4, 5, 7, 8, 9, 10

Job Seeking/Job Getting

Ohio, Part 1: 4, 5, 6, 7, 11, 15, 17, 21, 22, 30, 32

PECE: 2, 3, 4, 7, 9, 32, 42, 56, 58, 75

New Mexico 5006: 2

Career Awareness

Ohio, Part 1: 2, 3, 9, 10, 12, 13, 14, 16, 18, 19, 20, 23, 25, 26, 27, 28, 29, 31, 33, 34

Economic Awareness

PECE: 48, 59, 60, 63, 68

Table 5.6

Learner Outcome Construct Items

Grade 11

Occupational Self-Awareness

Ohio, Part 2: 2, -3, 4, 5, 6, -7, 8, 9, 10, -12, -13, -14, -15, -16, 18, -19, -20, -22, 23, -24, -26, -27, -28, 29, -30, -31, -32, -34

Work Values

New Mexico 5001: 2, 3, 5, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 25

New Mexico 5006: 11

Interest in Career Preparation

New Mexico 5006: 12, 13, 15, 16, 17, 18, 19, 20

Attitudes Towards Work

New Mexico 5001: 1, 6, 13

Knowledge of Work Values

Ohio, Part 1: 4, 28

PECE: 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 19, 22, 23, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 38, 40, 43, 45, 46, 47, 48, 49, 51, 52, 54, 55, 61, 62, 66, 69, 70, 71, 73

Decision Making

New Mexico 5006: 1, 3, 4, 5, 6, 7, 8, 9, 10

New Mexico 5002: 1, 2, 4, 5, 6, 8, 9, 11, 13, 17, 19, 20

New Mexico 5007: 1, 2, 3, 5, 6, 7, 8, 10, 12, 13, 14, 16, 17, 18, 19, 20

New Mexico 5008: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25

Job Seeking/Job Getting

Ohio, Part 1: 2, 5, 11, 14, 23, 34

PECE: 3, 9, 30, 58, 64, 75

New Mecico 5006: 2

New Mexico 5002: 12, 14

New Mexico 5007: 4, 9

Career Awareness

Ohio, Part 1: 3, 7, 8, 9, 13, 15, 16, 17, 18, 19, 25, 26, 27, 31, 32

Economic Awareness

PECE: 59, 63, 68

Chapter 3), was probably unnecessary for the affective items.

The homogeneity of the constructs tended to increase at the higher grade levels. This was not true, however, for the construct "Attitudes Towards Work"; nonetheless, we retained this construct at the higher grades, both because of its transferability and because of our position of conservatism with regard to the rejection of factors.

In order to provide some sort of comparison against which to judge the homogeneities of the constructs, the homogeneities of the intact tests were also computed. (These are also presented in Tables 5.1, 5.2, and 5.3). Despite the fact that the constructs were based on fewer items, they tended to have higher homogeneities than the intact tests. Measures of internal consistency are directly related to test length (the effect of length can be estimated by the Spearman-Brown formula (Anastasi, 1969, p. 83). Thus, the fact that the constructs have homogeneities greater than the intact tests even though they have fewer items would indicate that the constructs process much more internal consistency. The low homogeneity of the Ohio Test, Part 2, can be ascribed to the fact that, in the absence of publisher's instructions, all of the items were added together to compute the homogeneity of the intact test; the factor analysis indicated, however, that many of the items should be subtracted rather than added. The overall higher homogeneity of the constructs was taken as support for the position that factor analytically-derived constructs provide a better measure of a psychological attribute than do constructs whose items are grouped together solely on the basis of content validity.

The final set of measures included in Tables 5.1, 5.2, and 5.3 are the pre/post invariance, the black/white invariance, and the Construct Differentiation Index (CDI). They measure reliability, transferability, and stability, respectively. Since both of the invariance measures are correlation statistics and must thus, lie in the range of 0 to 1, inspection of the tables indicated that with the exception of "Attitudes Towards Work", the affective constructs remained invariant across time and ethnic group for all three grades. For "Attitudes Towards Work," the ethnic invariance was low for all three grades, especially the eighth, where the pre/post invariance was also quite low. The CDI for this construct was also considerably higher in grades eight and eleven than for the other affective constructs. All of this, coupled with the homogeneity data, indicated that results involving "Attitudes Towards Work" should be interpreted with some caution for grades eight and eleven but that the other affective constructs seemed to be accurately reflecting the presence of an organizing influence in the data.

With the four affective learner outcome constructs established, we turned to the examination of the cognitive items of the learner outcome battery. The principal components analysis of the grade five cognitive items produced three eigenvalues greater than one, and a fourth eigenvalue with a value of .89. The proportion of total variance explained by the first two factors were eighteen percent; the next two factors each added an additional one percent, and the fifth factor added one-half of one percent.

The principal components analysis of the grade eight cognitive items yielded four eigenvalues greater than one, with a fifth eigenvalue of .86. The proportion of total variance explained by the first three factors was twenty-five percent; the fourth and fifth factors each added an additional one percent, and the sixth factor added one-half of one percent.

The principal components analysis of the grade eleven cognitive items yielded six eigenvalues greater than one. The proportion of variance explained by the first three factors was thirty-one percent; the fourth and fifth factors again added about one percent, and the sixth factor added an additional one-half of one percent.

The items with the highest loadings on each factor were then examined. As with the affective factors, a high degree of transferability was observed among the cognitive factors. The items with the highest loadings are reported in Tables 5.1, 5.2, and 5.3. The construct "Knowledge of Work Values" had high loadings associated with items 17, 23, 35, 40, adn 46 of the PECE at all three grade levels. Items 3 and 10 of the New Mexico Test 5006 loaded highly on the "Decisionmaking" construct for both grades eight and eleven (the test items associated with Decisionmaking were not administered to grade five). Items 59, 63, and 68 of the PECE had high loadings at all three grade levels for the construct "Economic Awareness."

Over all three grade levels, two other factors were observed consistently; one consisted exclusively of Ohio Test Part 1 items, and the other was a mixture of Ohio Test Part 1 and PECE items. The transferability of these five constructs was responsible for

all of them being retained, although the results of the principal components analysis indicated that four factors probably would have been sufficient. The first cognitive factor included the following items:

- When choosing an occupation, a person should be concerned for himself, as well as society as a whole
- When a person reaches middle age, he is too old to go to school again
- A career might include a series of several jobs
- A person may become tense and worried in one job, and yet be relaxed in another job

All of these items seem to be measuring an awareness of values that one should have in the world of work. Consequently, the construct was labeled "Knowledge of Work Values."

The next factor included the following items:

- Mike would like to become an actor. Which one of the following activities would most help him achieve his goal?
- Luce, eighteen, wants to get a job in the assembly line at a factory. Which of the following would be the least helpful to her in obtaining the job?
- Benito is hoping to drive a bus for the city bus company. He is preparing a folder of information for a job interview. Which of the following is the most necessary information to take to the interview?
- Consuelo works with eight other computer programmers. She, like the others, is hoping to become a systems analyst. Usually the most efficient programmer gets promoted to systems analyst. What should she do to obtain the promotion?

All of these items seem to relate to making choices regarding career-related activities; consequently, the construct was labeled "Decisionmaking."

The next factor included the following highly loaded items:

- A person who is learning how to do a job, while working with somebody who knows the job, is working as _____(grade 5)

- Which of the following is the division of a factory which takes care of repairing machinery and keeping everything in good working order? (grade 5)
- A proprietor is someone who _____ (grade 8)
- Which of the following is a part of the hospitality industry? (grade 8)
- A person who enjoys music and sound systems, and is good at math, might be interested in a career as _____. (grade 11)
- A brief outline of your training and work experience is called _____. (grade 11)
- If a person thinks of himself as a "shy" person, which of the following would probably be an undesirable occupation?"
- The first thing a person who wants to establish a manufacturing business should ask himself is:

Most of these items seem to be related to searching for and acquiring employment. Consequently, the construct was labeled "Job Seeking/ Job Getting."

The fourth factor contained the following items with the highest factor loadings:

- The current gas and fuel oil situation has the most effect on the jobs of which of the following? (grade 5)
- A student is responsible for having pencils and paper at school just like a plumber is responsible for having _____. (grade 5)
- A person interested in an acting career needs to be able to _____. (grade 8)
- Occupations which deal directly with the public are best suited for people who show strong interest in _____. (grade 8)
- The veterinarian's education and training is similar to that of _____. (grades 8 and 11)
- A good credit rating is a sign of _____. (grade 11)

- When making a decision among several alternatives, the best alternative is the one that agrees with a person's _____. (grade 11)

All of these items tend to deal with a knowledge of what is involved in various occupations. Consequently, the construct was labeled "Career Awareness."

The fifth factor contained the following items:

- In what way is a person who does not work a "drag" on society?
- To become a registered nurse, a person may:
- The "employment outlook" of an occupation refers to:
- In making career plans, which of the following is least important?

These items tend to deal with financial aspects of the world of work and adult life; thus, we labeled this construct "Economic Awareness."

As with the affective constructs, the homogeneities for the constructs with each one of the items removed were computed; the items producing the highest homogeneity were retained. They also are enumerated in Tables 5.4, 5.5, and 5.6. The number of items retained and the final homogeneity is included in Tables 5.1, 5.2, and 5.3, along with the possible range of scores, the mean and standard deviation for the construct scores for the randomly selected sample, and the mean, minimum, and maximum of the variances for each item constituting the construct. The range of possible scores is based on the scoring procedures for the items outlined in Chapter 3. It should be noted that, for the cognitive constructs, all item scores were added together. This was done because scoring correctly on a cognitive item would, presumably,

indicate greater knowledge. As with the affective constructs, the homogeneities of the cognitive constructs tended to be superior to the homogeneities of the intact batteries of cognitive items. The variances of the cognitive items, however, tended to be much lower than the variances of the affective items. Consequently, the use of the Gorsuch procedure for the cognitive items seems justified. Homogeneities again tended to increase with grade level. Inspection of the invariance measures and the CDI indicated that while the cognitive constructs tended to be reliable, the ethnic transferability of the cognitive constructs was not as high as for the affective constructs; thus the stability of the cognitive constructs was poorer than that of the affective constructs. "Job Seeking/Job Getting" exhibited exceptionally poor transferability. Examination of the black and white factor analyses indicated that it was a construct that seemed to be present only in the white data. The presence also of relatively higher CDI's for "Job Seeking/Job Getting" as well as "Career Awareness" and "Economic Awareness" indicated that results based on these constructs should be interpreted with caution. All of these constructs were retained, however, to serve as learner outcome measures.

To facilitate the use of these constructs for local evaluators, a simplified scoring procedure was used. Rather than use the weights from the factor estimation matrices, we employed a unit weighting system. Each item was associated with the construct with which it had its highest loading. The item scores were added to produce the construct score.

The reliability analyses were based on scores constructed in this manner, so that the final set of items that remained for each construct represents the "best" set of items to represent that construct under this scoring system.

There was generally a high degreee of specificity between the learner outcome constructs and the learner outcome batteries. In other words, items from one battery were rarely spread across more than one construct, as an examination of Tables 5.4, 5.5, and 5.6 reveals. Consequently, if an evaluator were interested in only one of these constructs, it is unlikely that more than one test from the learner outcome battery would have to be administered to produce reasonably satisfactory results.

Since the factors derived from these analyses were not orthogonal, the interfactor correlations were computed. Table 5.7 presents the correlations among the affective and cognitive factors for each grade. As can be seen, most of the correlations are fairly high, reflecting a large amount of common content.

The correlations are not strikingly similar across grades. As few items were identical and, of course, students across these grade levels would not be expected to be similar, the lack of uniformity in factor intercorrelations is not surprising.

The next instrument to be analyzed was the Self Observation Scales (SOS). The SOS scores were analyzed separately for each grade. The principal components analysis of the grade five data produced two eigenvalues greater than one,

Table 5.7

Affective and Cognitive Factor Intercorrelations

Grade 5

Affective	Work Values	Attitude Toward Work
Occupational Self-Awareness	.16	.38
Work Values		.12

Cognitive	Decision-making	Job Seeking/ Job Getting	Economic Awareness
Knowledge of Work Values	.18	.46	.01
Decision-making		.34	.65
Job Seeking/ Job Getting			.33

Grade 8

Affective	Work Values	Interest In Career Preparation	Attitudes Toward Work
Occupational Self-Awareness	.70	.50	.58
Work Values		.53	.50
Interest In Career Preparation			.47

Cognitive	Decision Making	Job Seeking/ Job Getting	Career Awareness	Economic Awareness
Knowledge of Work Values	.64	.16	.73	.22
Decision-Making		.33	.63	.41
Job Seeking/ Job Getting			.35	.30
Career Awareness				.26

Grade 11

Affective	Work Values	Interest In Career Preparation	Attitudes Toward Work
Occupational Self-Awareness	.69	.17	.55
Work Values		.21	.63
Interest In Career Preparation			.10

Cognitive	Decision Making	Job Seeking/ Job Getting	Career Awareness	Economic Awareness
Knowledge of Work Values	.60	.42	.60	.23
Decision-Making		.58	.36	.40
Job Seeking/ Job Getting			.36	.44
Career Awareness				.29

and the first two factors accounted for sixty percent of the variance. The principal components analysis of the grade eight data produced one eigenvalue greater than one, with a second eigenvalue of .78, and a third eigenvalue of .28. The first factor accounted for thirty-five percent of the variance, the second accounted for an additional eleven percent, and the third accounted for an additional four percent.

The principal components of the grade eleven data again produced one eigenvalue greater than one, with a second eigenvalue of .88, and the third a value of .21. The first factor accounted for thirty-seven percent of the variance; the second factor accounted for an additional thirteen percent, and the third factor accounted for an additional three percent.

An examination of the factor loading matrix showed that the SOS scores were all loaded most heavily on the first two factors for all three grade levels. This, in conjunction with the results of the principal components analysis, indicated that two factors were sufficient. Since the SOS scores are factor analytically derived, this analysis constituted, in effect, a second-order factor analysis; the measures of the two constructs were, thus, second-order factor scores.

As with the learner outcome constructs, the SOS constructs exhibited considerable transferability across grade levels. The SOS first-order scales associated with each construct

Table 5.8

SOS Constructs

Construct	First Order Scale	Homogeneity
Grade 11		
Academic Perceptions	School Affiliation Teacher Affiliation	.86
Social/Personal Perceptions	Peer Affiliation Self-Acceptance Social Confidence Self-Security Self-Assertion	.65
Grade 8		
Academic Perceptions	Teacher Affiliation School Affiliation	.84
Social/Personal Perceptions	Peer Affiliation Self-Acceptance Self-Assertion Self-Security Social Confidence	.74
Grade 5		
Academic Perceptions	School Affiliation Self-Acceptance Teacher Affiliation	.78
Social/Personal Perceptions	Peer Affiliation Social Maturity Social Confidence Self-Security	.75

are presented in Table 5.8. For grades eight and eleven, the groupings of the first-order scales were identical, for grade five, the only difference was the shift of the self-acceptance scale from one factor to the other. Since the first factor was comprised of scales identified as Teacher Affiliation and School Affiliation, it clearly seemed to be measuring the respondent's perceptions about his scholastic life. Consequently, the construct was labeled "Academic Perceptions."

The second construct, which included items such as Peer Affiliation and Self-Security, seemed to be measuring the respondent's perceptions about himself and his relationships with others. Consequently, we labeled this construct "Social/Personal Perceptions."

Unlike the learner outcome constructs, the two second-order SOS construct scores were computed using the weights derived in the factor estimation matrix applied to standardized scores. In addition, the construct scores were scaled so that they would have means of 50 and standard deviations of 10 for the group on which they were normed. The homogeneities computed for the two SOS constructs are presented in Table 5.8. Given that the first-order scale scores have test-retest reliabilities ranging from .73 to .88, these homogeneities would seem to lie within acceptable limits.

The third and final instrument submitted to the construct definition procedure was the Teacher/Counselor/Administrator Opinion Questionnaire. Since all three groups responded to

the same questionnaire, the teacher/counselor/administrator data were pooled for input to the factor analysis. The principal components analysis produced two eigenvalues greater than one, and the third eigenvalue was .78. The first two factors accounted for twenty percent of the total variance, the third factor accounted for an additional two percent, and the fourth factor accounted for an additional one percent. An examination of the factor loading matrix revealed that all but two of the forty items were loaded most heavily on the first three factors. In the absence of any additional information upon which to judge the usefulness of these factors, we decided to retain the first three to insure that major effects of program on practitioner attitudes would not be overlooked. As with the SOS, the three opinion constructs were scored using the weights from the factor estimation matrix applied to standardized scores.

The items which loaded most heavily on each factor are presented in Table 5.3, along with the number of items associated with each construct and the homogeneity of each construct. The first factor included the following items with high loadings:

- Infusing career education into the curriculum enhances student interest in learning.
- Active participation in a career education program will enhance a teacher's overall teaching effectiveness.
- Without an effective career education program, most students, upon graduation, would lack the decisionmaking skills necessary for adapting in today's rapidly changing world.

Table 5.9

Practitioners' Value Internalization Constructs

Construct Label	# Items	Items	Homogeneity
Perceived Benefits	18	3, 6, 16, 18, 37	.83
Perceived Burden	13	7, 24, 29, 34, 40	.65
Role of Schools	7	12,21,22,23,36	.66

These items tended, for the most part, to deal with practitioners' view of the benefits of career education for the students. Consequently, this construct was given the label "Perceived Benefits."

The second factor included the following items:

- Career education is asking teachers to take on the role of the counselor.
- Career education cannot be done effectively without the addition of new courses and facilities to the present educational programs.
- Few business people in this community have the time and the interest to give career-related presentations to school classes.

These items seem to be related to the practitioners' view of the extra responsibilities that career education programs place upon them. Consequently, this construct was labeled "Perceived Burden."

The third factor included the following items:

- Career education is more important for the non-college-bound student.
- Career education fosters premature career decisions.
- Career education is really quite different from vocational education.

These items tend to be related to perceptions of what the schools' responsibilities are in preparing students for the world of work. We labeled this construct, consequently, "Role of Schools."

External Construct Review

One of the steps in the iterative process of extrinsic definition is the submission of proposed constructs to an informal, but independent group of reviewers. Five reviewers

were contacted by NTS for this purpose. Each was sent a copy of Chapters 3 and 5 of this volume, with each of the construct labels "blanked out." Each was also sent a copy of the factor loading matrix, with the text of the item and its loading included. We requested these individuals provide us with labels reflecting our perceptions of what each of the constructs was measuring. Table 5.10 presents the panel's suggested labels juxtaposed with those used in this study. As is evident, little agreement was present on exact wording, though there was some agreement on the central concept encompassed by a few of the measures. The lack of overall agreement reiterates the recommendation made elsewhere in this report (Volume I, Chapter 5) that "OCE and/or NIE should consider funding a comprehensive instrument development effort with provisions for specifying in more detail the range of constructs considered important in career education. Such a study might give particular attention to the intrinsic and extrinsic definitional properties of proposed construct measures."

Table 5.10

Results of External Review of Construct Labels

Label Used in This Study	Suggested Labels
Occupational Self-awareness	Self-awareness/Career Decisionmaking
	Basic Career Realities
	Realities of Career Decisions
	Career Naivete' Index
Work Values	Job Attitudes and Values
	Worth of Work
	Attitudes Toward Work
	Centrality of the Work Role
	Valence Toward Work
Interest in Career Preparation	Job and Career Training Prerequisites
	Career Readiness
	Attentiveness to Personal Future
	Intra-personal Career Proximity
Attitudes Toward Work	Career Prepartion and Realities of Work
	Career/Work Cynicism or Career Optimism (depending on scoring)
	Anticipatory Work Anomie
Knowledge of Work Values	Work Values and Career Awareness
	Realities of Careers
	Work Realities
Decisionmaking	Key Decisions for Career Advancement
	Career/Work Adaptability: Nontechnical Skills
	Career Interpersonal Skills
Job Seeking/Job Getting	Knowledge of Career Access
	Job Seeking/Job Getting
Career Awareness	Job and Occupational Duties
	Knowledge of Self and Careers
Economic Awareness	Labor Market Awareness
	Economic and Career Awareness

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